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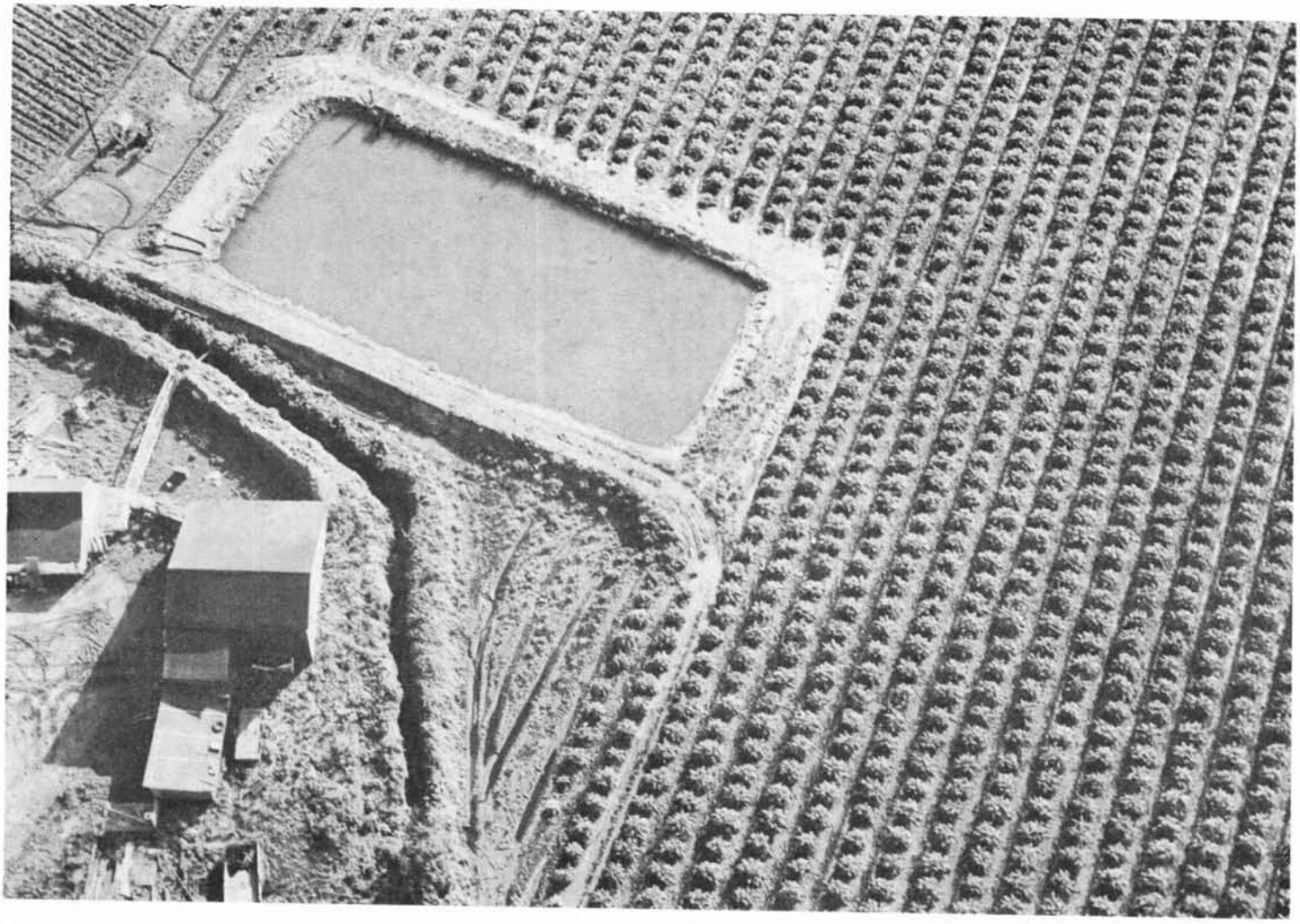
SOIL SURVEY
San Mateo Area
CALIFORNIA



UNITED STATES DEPARTMENT OF AGRICULTURE
Soil Conservation Service
in cooperation with
CALIFORNIA AGRICULTURAL EXPERIMENT STATION

HOW TO USE THE SOIL SURVEY REPORT

THIS SOIL SURVEY of the San Mateo Area will serve several groups of readers. It will help farmers in planning the kind of management that will protect their soils and provide good yields; assist engineers in selecting sites for roads, buildings, ponds, and other structures; aid ranchers in managing their grazing lands; and add to the soil scientist's fund of knowledge.

In making this survey, soil scientists dug holes and examined surface soils and subsoils; measured slopes with a hand level; noticed differences in the growth of crops, weeds, and brush; and, in fact, recorded all the things about the soils that they believed might affect their suitability for farming and related uses.

The scientists plotted the boundaries of the soils on aerial photographs. Then, cartographers prepared from the photographs the detailed soil map in the back of this report. Fields, woods, roads, and many other landmarks can be seen on the map.

Locating the soils

Use the index to map sheets to locate areas on the large map. The index is a small map of the area on which numbered rectangles have been drawn to show where each sheet of the large map is located. When the correct sheet of the large map is found, it will be seen that boundaries of the soils are outlined, and that there is a symbol for each kind of soil. All areas marked with the same symbol are the same kind of soil, wherever they appear on the map. Suppose, for example, an area located on the map has a symbol DuA. The legend for the detailed map shows that this symbol identifies Dublin clay, nearly level. This soil and the other soils in the county are all described in the section, Descriptions of Soils.

Finding information

Few readers will be interested in all of the soil report, for it has special sections for different groups. The introductory part, which mentions climate and physiography, will be of interest mainly to those not familiar with the county.

Farmers and those who work with farmers can learn about the soils in the section, Soils of the San Mateo Area, and then go to the section, Use, Management, and Estimated Yields. In this way they first identify the soils on their farms and then learn how these soils can be managed and what yields can be expected. The soils are grouped by capability units; that is, groups of soils that need similar management and respond in about the same way. For example, in the section, Descriptions of Soils, Dublin clay, nearly level, is shown to be in capability unit IIw–2. The management this soil needs will be found under the heading, Capability Unit IIw–2, in the section, Use, Management, and Estimated Yields. Appendix II, the guide to mapping units, will be useful in working with the soil map and report. This guide gives the map symbol for each soil, the page on which the soil is described, the capability unit in which the soil has been placed, and the page on which this capability unit is described.

Engineers will want to refer to the section, Engineering Interpretations. Tables in that section give test data and engineering performance characteristics for representative soils of the county.

Soil scientists will find information about how the soils were formed and how they were classified in the section, Genesis and Classification of Soils.

Students, teachers, and other users will find information about soils and their management in various parts of the report, depending on their particular interest.

* * * *

Fieldwork for this survey was completed in 1956. Unless otherwise indicated, all statements in the report refer to conditions in the Area at that time. This publication on the soil survey of the San Mateo Area, Calif., is a cooperative contribution from the Soil Conservation Service and the California Agricultural Experiment Station.

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Issued May 1961

SOIL SURVEY OF THE SAN MATEO AREA, CALIFORNIA

By RICHARD J. WAGNER and RALPH E. NELSON, Soil Scientists, Soil Conservation Service

Soils surveyed by RICHARD J. WAGNER, GORDON E. SHIPMAN, HERBERT A. HOPPER, WILLIAM A. HALLISEY, and GEORGE K. GIBBS, Soil Scientists, Soil Conservation Service, and RODNEY J. ARKLEY, University of California

United States Department of Agriculture, University of California Agricultural Experiment Station

THE BEAUTIFUL coastal section of San Mateo County, Calif., contains small, fertile valleys and benches overlooked by the redwood- and fir-covered mountains that rise to the east.

The county is divided into two general sections by the high mountain range that is a northward extension of the Santa Cruz Mountains. The area covered by this soil survey lies mostly west of the divide and drains into the Pacific Ocean. It is still mainly farm and forest land. The eastern side of the county, which drains into San Francisco Bay, is largely urban and industrialized.

For many years, the urban sections contained mostly homes of people who worked in San Francisco. Many people still commute, but industries and small businesses are changing the trend, and the communities are becoming more self-sufficient.

Although the southwestern part of the county is still mainly in farms and forests, there is pressure from the nearby business areas for more building sites. Several thousand acres of farmland have been converted to urban uses since 1945.

The climate is mild, and fogs tend to keep temperatures moderate in summer. The moist air and even temperatures make possible the growing of several specialty crops. Globe artichokes and brussels sprouts of high quality have been grown for many years. More recently, cut flowers have accounted for a large part of the county's farm income. Markets for these products are nationwide. A field where artichokes are growing is shown on the cover of this report.

Much of the rolling and hilly land that adjoins the valleys was plowed as the agriculture expanded in the 1860's. Many of the steep soils were cultivated intensely, with the result that scars caused by sheet and gully erosion can still be seen.

People in the county organized a soil conservation district, the first one in California, to help guide uses of the soils and water. A report on soils in the original district in the northwestern part of the county was published by the Soil Conservation Service in 1943. The present report deals with soils on land that was later included in additions to the district, along with some other land in the part of the county that drains to the Pacific Ocean.

General Nature of the Area

This section is provided mainly for those readers who are not familiar with San Mateo County. It tells about the location and extent of the county and of the area covered by the soil survey. It also describes the physiography, relief, and drainage and gives some facts about the climate.

Location and Extent

San Mateo County lies south of San Francisco along the coast of California (fig. 1). San Francisco Bay forms the northeastern boundary. The land area is 454 square miles. The soil survey covers 168,898 acres and takes in about 90 percent of the farm and forest lands of the county. The county and the surveyed area are shown in figure 2. The survey covers the San Mateo Soil Conservation District, except the part that was covered by the survey of physical land conditions published in 1943. Towns and other heavily populated areas within the district were not surveyed.

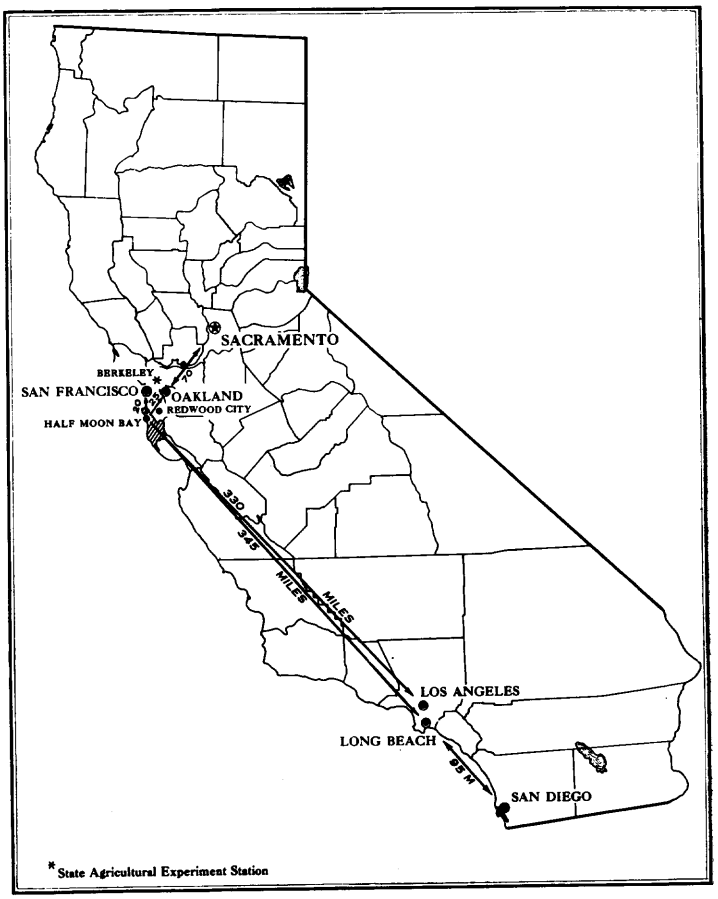

Figure 1.—Location of the San Mateo Area in California.

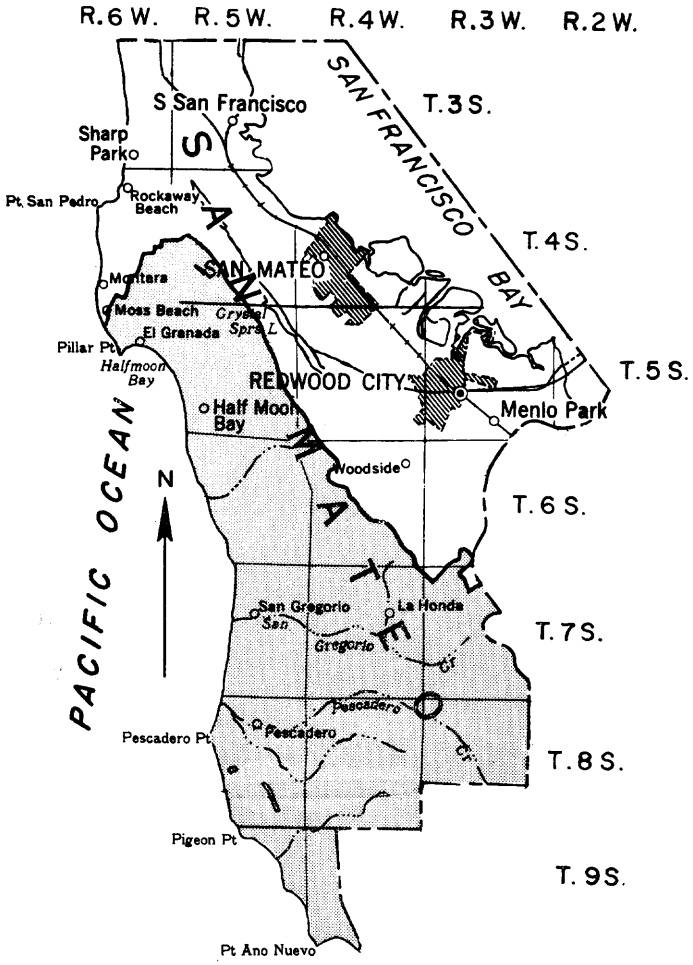

Figure 2.—**Outline map of San Mateo County showing the part covered by this soil survey.**

Physiography, Relief, and Drainage

Southeast of San Francisco Bay, the Santa Clara Valley lies between two parts of the Coast Ranges of mountains—the Diablo Range on the east and the Santa Cruz Range on the west (*7*).[1] San Mateo County is on the peninsula that is dominated by the Santa Cruz Range, which extends from Santa Cruz County northward about 85 miles to the Golden Gate. The highest peak is Sierra Morena, which is about 2,400 feet above sea level. Figure 3 shows the relief in a general way.

The San Andreas fault zone, a zone in which several earthquakes have occurred, lies within the Santa Cruz Range and extends throughout its length. It meets the sea just south of Merced Valley. The fault zone is marked by a series of alined valleys that are just east of the divide. Two of the valleys are occupied in part by San Andreas Lake and Crystal Springs Lake.

Remnants of two levels of geological erosion are present in the Santa Cruz Range; one is preserved on the summit of Buri Buri and other ridges, at an elevation of about 600 feet; the other is preserved on Sawyer Ridge and other crests at elevations between 1,100 and 1,200 feet.

[1] Italic numbers in parentheses refer to Literature Cited, p. 93.

On the western side of the divide, the Coast Range generally rises abruptly from the sea. Throughout much of the Coast Range, the seaward slope is notched by a series of raised, wave-cut terraces, the highest of which are more than 1,500 feet above the sea. The lower ones are the best preserved and in places are a mile or so wide (*1*).

Stream terraces in the valleys of the Coast Range are lower and less pronounced than the marine terraces along the coast. This is believed to indicate tilting of the Coast Range, the greatest uplift being along the coast.

Recent submergence of the coastal region is indicated by the presence of San Francisco Bay and numerous drowned valleys for some distance to the north and south. There is evidence of more recent emergence, following the drowning of the bay and the coastal area.

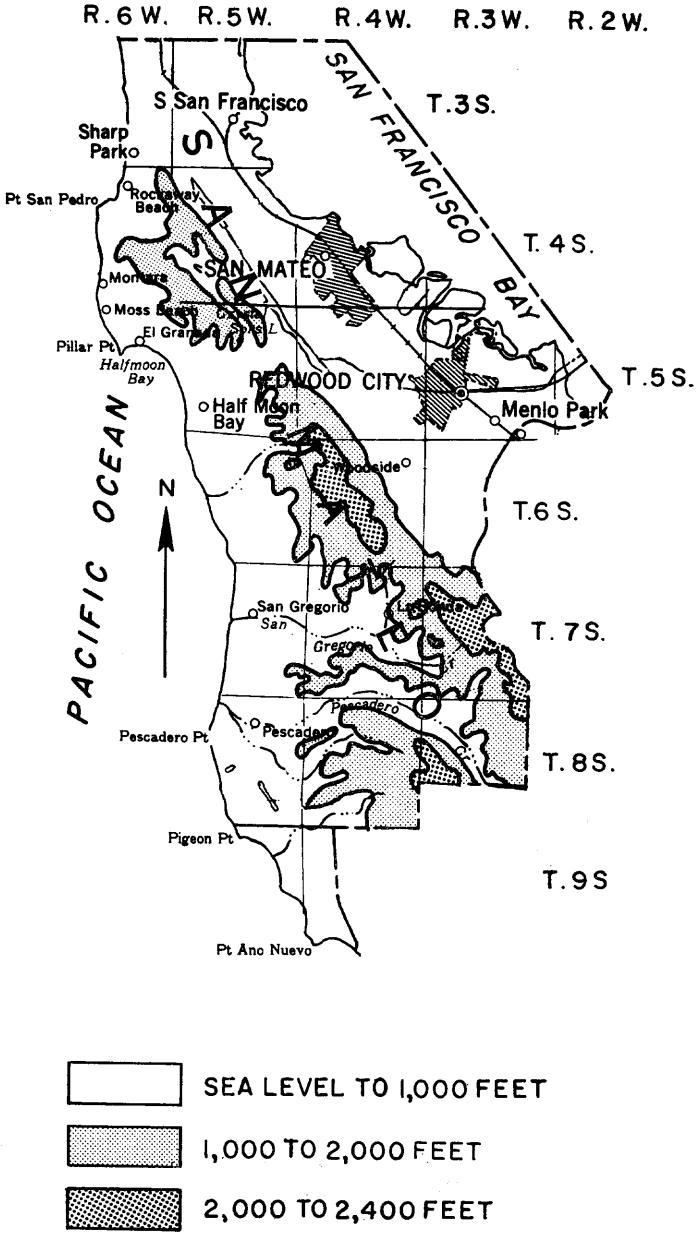

Figure 3.—**Relief map of San Mateo County.**

Figure 4.—**Steep cliffs of terraces along the coast. The nearly level soil on the terrace at the left is a Watsonville soil. The rolling, gullied one is a Tierra soil.**

Below the first main marine terrace in the northern part of this general area, at an elevation of 25 feet, there are numerous remnants of a lower level, some as much as 250 feet in width. Approximately five terraces are present along the coast from Santa Cruz to San Francisco, some of which are all but obliterated in places. As a rising sea appears to have played no part in the terrace formation, all the terraces are, therefore, believed to be the result of uplift. Fluctuations in sea level brought about by the expansion and retreat of continental glaciers during the Pleistocene period, under conditions of slow uplift of the land, enabled marine erosion to develop marine terraces. Figure 4 shows the terrace cliffs along the coast. The principal town in the surveyed area, Half Moon Bay, is on one of the lower marine bench terraces at an elevation of 69 feet.

Most of the streams of the San Mateo Area, the part covered by this survey, originate within the Area. The drainageways are not of great length, but, because they originate in areas of high rainfall along the eastern crest of the Coast Range, they carry a large volume of runoff water during winter and spring.

The drainage pattern is formed by a number of small streams, which merge to form larger ones or flow directly into the Pacific Ocean. From the standpoint of watershed area and annual volume of flow, the three main streams are Pescadero Creek, with 39,449 acres of watershed area; San Gregorio Creek, with 34,042 acres; and Pilarcitos Creek, with 19,063 acres. These are perennial streams. Pescadero Creek is joined at its mouth by Butano Creek, which drains 13,925 acres.

From north to south the major streams are San Vicente Creek, draining 3,527 acres; Denniston Creek, 2,636 acres; Arroyo de Medio, 953 acres; Frenchman Creek, 2,905 acres; Pilarcitos Creek, 19,063 acres; Arroyo Canada Verde, 1,470 acres; Purisima Creek, 5,787 acres; Lobitos Creek, 2,637 acres; Tunitas Creek, 7,687 acres; San Gregorio Creek, 34,042 acres; Pomponio Creek, 4,589 acres; Pescadero Creek, 39,449 acres; Butano Creek, 13,925 acres; Arroyo de los Frijoles, 2,730 acres; Gazos Creek, 7,487 acres; Whitehouse Creek, 3,193 acres; Cascade Creek, 2,458 acres; Green Oaks Creek, 1,869 acres; Ano Nuevo Creek, 306 acres; and Finney Creek, 631 acres. Most of these are perennial streams, and dams have been established along several of them to provide irrigation water. Pescadero and San Gregorio Creeks have as tributaries several well-known smaller streams.

Climate

The climate of the San Mateo Area is characterized by dry, mild summers and moist, cool winters. About 80 percent of the total annual precipitation occurs during the months of November through March. In the winter moisture-laden air moving in from the ocean rises as it

TABLE 1.—*Temperature and precipitation data for Half Moon Bay, San Mateo County, Calif.*[1]

[Elevation, 36 feet]

Month	Temperature					Precipitation			
	Highest	Average daily maximum	Average daily	Average daily minimum	Lowest	Greatest	Average	Least monthly	Greatest daily
	°F.	°F.	°F.	°F.	°F.	Inches	Inches	Inches	Inches
January	76	57. 4	49. 7	41. 9	27	10. 48	4. 27	0. 65	3. 51
February	74	57. 7	50. 4	43. 0	30	8. 33	4. 38	1. 98	2. 38
March	75	59. 5	51. 7	43. 9	32	6. 32	3. 44	. 77	3. 85
April	85	60. 7	52. 7	44. 8	35	4. 88	1. 87	(2)	2. 36
May	93	62. 3	55. 0	47. 7	35	1. 32	. 68	. 09	. 65
June	90	64. 4	57. 1	49. 9	41	. 84	. 20	0	. 38
July	73	64. 1	58. 2	52. 3	43	. 20	. 02	0	. 20
August	86	64. 2	58. 5	55. 4	42	. 17	. 01	0	. 09
September	90	66. 9	58. 9	51. 0	38	. 48	. 11	0	. 44
October	86	65. 3	56. 4	47. 5	33	3. 23	1. 48	. 29	2. 27
November	81	63. 0	54. 1	45. 1	34	5. 60	2. 66	. 46	2. 56
December	72	58. 5	51. 6	44. 6	29	8. 93	4. 34	. 90	1. 95
Annual	93	62. 0	54. 5	47. 3	27	10. 48	23. 46	0	3. 85

[1] Based on an 11-year record, 1944–1955.

[2] Trace.

reaches the coast and passes inland over the mountains. Precipitation increases as the air is lifted. It ranges from about 20 inches in some areas along the coast to 50 inches farther inland where the elevation is more than 2,000 feet. Occasionally, snow falls on the high areas along the crest of the Santa Cruz Mountain Ridge, but it remains only a short time and is inconsequential.

The coastal areas experience frequent fogs, which help maintain moderate temperatures. The only available temperature records, taken at the station at Half Moon Bay, show a variation of less than 10 degrees in average daily temperature between the winter and summer months (table 1).

South of Pigeon Point, the coastline curves eastward. In this area temperatures are generally warmer and there are fewer days of fog.

Days are rarely hot. However, there are usually several days each year when hot winds from the valleys to the east overcome the prevailing cool, westerly breezes. At such times, temperatures sometimes reach as high as 90° F., with accompanying low humidity.

The climate along the coast is ideal for several specialty vegetable and flower crops. The average growing season is about 319 days per year. In areas of higher elevation, the growing season is somewhat shorter and there are greater extremes in day and night temperatures and in seasonal temperatures. Here, the cool spring weather tends to retard the early growth of plants.

The pattern of rainfall is rather complex. Differences in precipitation occur over short distances, depending upon local variations in topography as well as upon the elevation. This is especially true from west to east, and rainfall at some places is double that just 10 miles away.

The deep, west-facing canyons are often shrouded in mist during many days of the year, especially in winter when low clouds prevail at higher elevations. In summer these same canyons are penetrated by fog that blows in from the ocean. This type of climate is ideal for redwood trees; many of the canyons from Purisima to the southern tip of the county are covered with forests of redwood and fir.

The prevailing wind during the growing season is from the west. It is a cooling breeze, bringing with it much of the fog that is so common along the coast during the summer months. Because of the cooling effect, the coastal strip is well suited to growing brussels sprouts, artichokes, and flowers. Because of the nearness to the ocean, the humidity is rather high and evaporation is low. The only time excessive evaporation occurs is during periods of strong, dry north winds in the late part of winter and in spring.

Table 2, compiled by the Agricultural Extension Service of the University of California, contains records of

TABLE 2.—*Average annual precipitation recorded at 12 gages*

Station	Elevation	Length of record	Average annual precipitation
	Feet	Years	Inches
Pilarcitos	695	90	45. 34
San Andreas Lake	377	86	35. 82
Upper Crystal Springs Reservoir	300	78	30. 80
Lower Crystal Springs Reservoir	300	64	27. 44
Crystal Springs Cottage	300	60	27. 25
Pescadero	420	17	54. 56
Pigeon Point Lighthouse	50	24	21. 56
Cuesta La Honda	450	22	26. 97
Half Moon Bay	50	14	24. 31
Souza Ranch	250	6	25. 58
Saratoga Gap	2, 600	7	53. 93
Skyline	1, 450	5	48. 72

the annual rainfall measured at 12 gages in the general area. Rainfall data from 35 stations were used to prepare the isohyetal map (fig. 5). The lines on this map are lines of equal precipitation (isohyets).

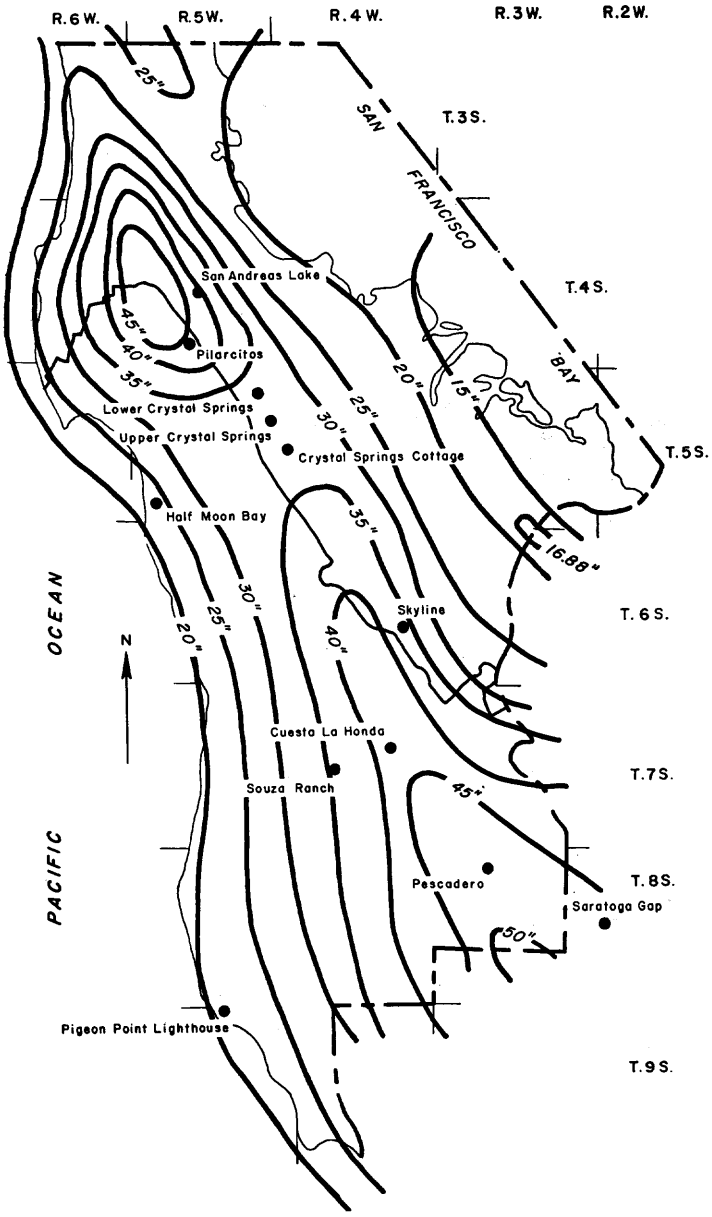

***Figure 5.*—Average annual precipitation in San Mateo County.**

Average evaporation, according to measurements by the San Francisco Water Department, is 4.5 feet per year. This is the average of measurements taken at Crystal Springs Lake, Pilarcitos Lake, and San Andreas Lake.

Expected 24-hour rates of rainfall and average annual rainfall for San Mateo County are given in table 3, and the maximum 24-hour rainfall at places where records of the seasonal rainfall have been kept is given in table 4.

TABLE 3.—*Expected 24-hour rates of rainfall and average annual rainfall for San Mateo County*

Average annual rainfall	Frequency of 24-hour rainfall			
	Once in 5 years	Once in 10 years	Once in 25 years	Once in 50 years
Inches	*Inches*	*Inches*	*Inches*	*Inches*
17.5	1. 60	1. 98	2. 40	2. 60
22.5	2. 08	2. 54	3. 10	3. 36
27.5	2. 53	3. 10	3. 80	4. 85
32.5	3. 00	3. 67	4. 50	4. 85
37.5	3. 45	4. 23	5. 20	5. 62
42.5	3. 92	4. 80	5. 90	6. 38
47.5	4. 37	5. 36	6. 56	7. 12

TABLE 4.—*Maximum 24-hour rainfall at five stations*

Length of record	Station	Frequency of 24-hour rainfall				Average annual rainfall
		Once in 5 years	Once in 10 years	Once in 25 years	Once in 50 years	
Years		*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
32	San Francisco	2. 25	2. 63	2. 96	3. 18	21. 85
90	Pilarcitos	3. 60	4. 30	5. 20	5. 75	45. 34
32	San Andreas Lake	3. 39	4. 22	5. 00	5. 40	37. 52
32	Lower Crystal Springs Reservoir	2. 67	3. 30	4. 09	4. 62	30. 14
32	Crystal Springs Cottage	2. 40	3. 10	4. 10	5. 00	28. 79

Soil Associations

A map of soil associations shows the extent and distribution of important patterns of soils. Each association contains one or more soils; the soils in an association can differ greatly from one another. Often a soil association is named for one or more of the soil series that are prominent in it. In this survey area the soil associations are named by giving the name of the most extensive soil series first, then the names of one or more less extensive soils.

Seven soil associatons have been shown on the colored soil map that is bound in the back of this report. Four associations are on uplands, and three are on terraces, flood plains, and fans. These physiographic areas and the soil associations in them are described in the following pages.

Soils of the Uplands

Uplands comprise about 80 percent of the survey area. At the higher elevations are steep and very steep mountains. The foothills are generally sloping to steep, with many very steep canyons. Rainfall is greatest at the high elevations and in protected canyons. The rocks are dominantly sedimentary rocks of the Monterey, Purisima,

Butano, and Vaqueros formations, with smaller areas of basic igneous rocks and one area of acid igneous rocks.

Soil associations have been mapped principally on the basis of soil differences that are related to differences in parent rocks. Soils on sedimentary rocks make up two different associations because there are differences in slope, in depth, and in kind of soil. The following four soil associations have been mapped and described in the uplands:

1. Hugo-Butano: Steep and very steep, brownish, moderately deep and deep soils on sedimentary rocks under coniferous forest.
2. Miramar-Sheridan: Steep and very steep, dark-colored, shallow to deep soils on acid igneous rocks under shrubs and forest.
3. Sweeney-Mindego: Sloping to very steep, dark-colored, moderately deep soils on basic igneous rocks under grass or forest.
4. Lobitos-Santa Lucia-Gazos: Sloping to very steep, grayish-brown, very shallow to deep soils on sedimentary rocks under shrubs and grass with some trees.

Hugo-Butano

The Hugo-Butano soil association consists of well-drained to somewhat excessively drained soils on sedimentary rocks. The soils are predominantly steep and very steep. The forests consist of Douglas-fir, redwood, and a few hardwood trees. Elevations range from near sea level to about 2,400 feet, and the average annual rainfall averages from 35 to more than 45 inches.

The Hugo-Butano soil association occupies about 38 percent of the survey area. It is the most extensive association. It covers most of the southern part of the county, including nearly all of the Skyline crest, and in a few places dips down along coastal drainageways to the lower terraces. The Butano soils occur around Butano and Pescadero Creeks and extend southward.

The principal soils are of sandy loam or loam texture; sandy loams predominate in the Skyline area, and loams, in the vicinity of La Honda and southward. Most of the soils are deep, ranging in depth from 36 to 60 inches.

The Hugo soils are on the less siliceous sediments of the Butano, Purisima, and Vaqueros formations, where they are closely associated with the Josephine soils. The soils of both the Hugo and Josephine series have a brownish surface soil, but the Hugo soils have a yellowish-brown subsoil, nearly uniform texture throughout, and occupy exposed, steep and very steep slopes. The Josephine soils have a reddish-yellow subsoil of clay loam and occupy concave and protected slopes. The Butano soils are on siliceous shales of the Monterey formation; they have a brownish profile with slightly finer texture in the subsoil than in the upper horizons, and they are strongly acid above the parent rock.

A small acreage of soils developed on basalt or on colluvium has been included in this association. A significant acreage of very shallow, steep, brush-covered soils with conspicuous "chalk cliffs" of Monterey shale is also included. These denuded and sparsely vegetated spots probably resulted from severe erosion in the distant past. Possibly, the erosion was accelerated by fires. Further evidence of severe erosion in these areas is the prevalence of alluvium from Monterey shale along the southern coastal terraces. A few isolated areas of soils of the Cayucos, Gazos, Lobitos, Los Gatos, and Santa Lucia series also occur. Along Alpine Road, east of the Skyline crest, is a deep soil on somewhat softer parent material. This area has hardwood vegetation with a few scattered conifers.

The best use of the Hugo-Butano soil association area is for timber production. Trees mature in about 80 years. Nearly all the forests have been logged at least once, and second-growth stands of timber are common. Forest regeneration is fairly good, although in some areas brush and undesirable hardwoods constitute a large proportion of the stand. A few of the more gently sloping areas have been cleared and are being used for grazing. Housing developments occupy some of the wider ridgetops near the Skyline crest.

Miramar-Sheridan

The Miramar-Sheridan soil association consists of well-drained to somewhat excessively drained soils developed from acid igneous rocks. The soils occur on predominantly very steep slopes that have sharp, narrow ridgetops and on precipitous slopes on either side of the principal ridges. The vegetation consists of shrubs and some grasses, although sites that are sheltered from the wind have coniferous forests at higher elevations. Elevations range from sea level to about 2,000 feet. The average annual rainfall at the summit ranges from 22 to about 45 inches. This association is in the northern uplands and occupies less than 5 percent of the survey area.

The Miramar soils are on the windward, western slopes under shrub vegetation. They are moderately developed and have a surface soil of grayish-brown coarse sandy loam and a subsoil of brownish sandy clay loam. Reaction is slightly acid throughout. The Sheridan soils occupy leeward, very steep, east-facing slopes near the crest of the mountains and have coniferous vegetation. They have a very dark grayish-brown, neutral surface soil and brown, slightly acid subsoil; the texture throughout is coarse sandy loam.

At the base of the western slopes, a few very narrow valleys extend upward into the mountains. Soils on the narrow alluvial plains in these valleys are members of the Farallone series. They are included in the Miramar-Sheridan soil association because of their limited extent.

Some marketable timber is produced on the eastward slopes at high elevations. Because of the steep terrain and high rainfall, however, use of the land for watershed purposes is more important. At lower elevations, a few of the less sloping sidehills and ridges have been cleared. These are used to some extent for hay and range. Shrubs encroach rapidly, and abandoned fields and ranges are soon revegetated with coyotebrush, poison-oak, wild lilac, and other woody plants. Periodic fires in the uplands have destroyed vegetation and have resulted in considerable sheet erosion.

Sweeney-Mindego

The Sweeney-Mindego soil association consists of well drained to somewhat excessively drained soils on basic igneous rocks. The soils are steep or very steep and are on rounded, sloping and moderately steep ridgetops and

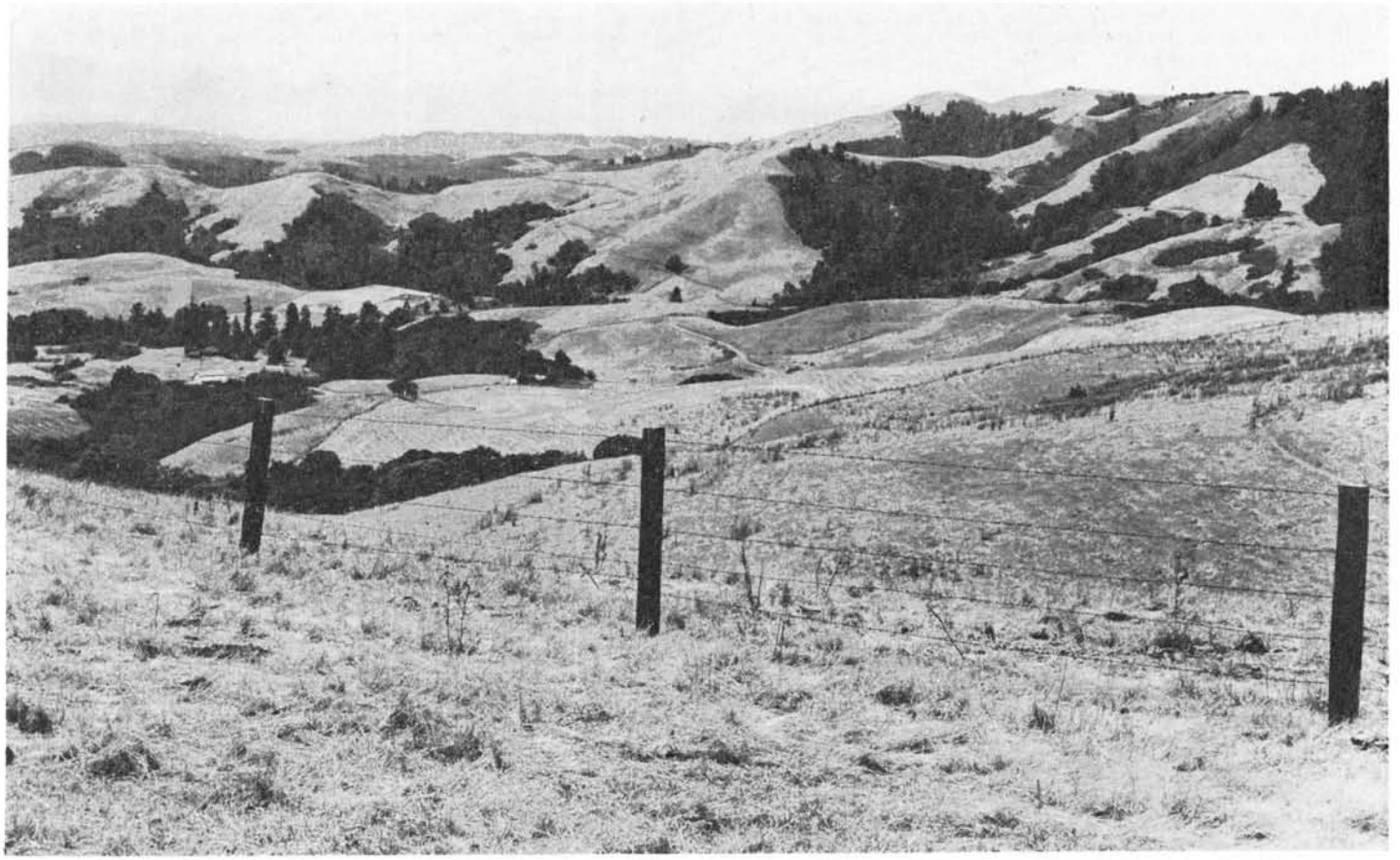

Figure 6.—**View near La Honda, about 1,500 feet above sea level. Hugo, Sweeney, Laughlin, and Santa Lucia soils.**

foot slopes (fig. 6). The higher areas have grass vegetation, with some shrubs and hardwoods on sheltered and north-facing slopes. The deep canyons, where more moisture is present, are covered with redwood, Douglas-fir, madrone, and tanbark-oak. Elevation ranges from about 1,000 to 2,000 feet, and the average annual precipitation, from 30 to 45 inches. The soils are moderately deep or deep.

This association is mainly in the central eastern uplands near the Mindego and Langley Hills and La Honda and in a small area north of Pilarcitos Lake. It occupies less than 7 percent of the survey area.

The Sweeney soils are somewhat more extensive than the Mindego soils. They are on the warmer and windier southern and western slopes, on the crests of ridges, and generally on the dry sites at high elevations. Their surface soil is dark grayish-brown, slightly acid clay loam. The subsoil is similar to the surface soil but is slightly finer textured in the upper part and grades to neutral, fine sandy loam above the parent rock. The Mindego soils are in very steep, protected, deep canyons under coniferous forests. Less evaporation occurs in these canyons than in more exposed places, and fogs and mists are prevalent. The soils are similar to the Sweeney soils in many respects, but they are very dark grayish brown throughout and have a thicker, neutral surface soil and a thicker clay subsoil.

The Sweeney soils are associated with Montara soils in the extreme northeastern corner of the survey area. The Montara soils are shallow and stony. They were developed on serpentine rocks under shrub vegetation. In a few areas rock outcrops in variable amounts occur, but these outcrops are of small extent and do not have a consistent pattern.

The Sweeney soils, where open and clear, are very productive of forage. Some of the more gently sloping soils along the Skyline crest, between Alpine and La Honda Roads, have been used successfully for hay crops and grain, although scattered rock outcrops interfere with farming operations. The soils have responded favorably to reseeding to adapted forage crops, fertilization, and other improved cultural practices. The Mindego soils produce good stands of timber, particularly of redwood.

Lobitos-Santa Lucia-Gazos

The Lobitos-Santa Lucia-Gazos soil association consists of well-drained to excessively drained soils on sedimentary rocks. The landscape consists of a succession of rounded ridgetops and steep-sided canyons. Relief ranges from sloping to very steep, but it is predominantly steep and very steep. The vegetation is largely shrubs and grasses. The elevation ranges from near sea level to 2,000 feet, but it is mostly between 300 and 1,000 feet. In general, the average annual rainfall ranges from 22 to 30 inches, but at high elevations the amount in some years is considerably greater.

This soil association is extensive and occupies about 30 percent of the survey area. It is the most extensive in the

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central part, between the upper forested zone and the marine terraces near the coast.

The Lobitos-Santa Lucia-Gazos soil association is rather complex because of a variety of parent materials. In addition to the soils named, the Pomponio and Cayucos soils are extensive. In general the soils have a dark-colored loam or silt loam A horizon and a lighter colored subsoil of similar or slightly finer texture. The soil ranges from very shallow to deep over bedrock, but 18 to 36 inches is the usual range.

The Gazos, Lobitos, and Pomponio soils occur together, mainly on the nonsiliceous sandstone. The Gazos soils occupy steep-sided canyons, tops of ridges, and other positions where they are subject to erosion. The soils show little development of horizons except for a moderate accumulation of organic matter in the upper part of the profile. The vegetation is mainly shrubs. The Lobitos soils are on less exposed places or on milder slopes, under grass vegetation. They resemble the Gazos soils, but the surface horizon is darker colored, the subsoil is distinctly finer in texture than the surface soil, and the depth of soil tends to be somewhat greater. The Pomponio soils have a clayey subsoil and concave slopes that are covered by grass and brush. The Cayucos soils are covered by grass and are on fine-textured sandstone or shale. They are deep and consist of clay loams or clay throughout. The Santa Lucia soils resemble the Gazos soils but are on siliceous shale under shrubs. They have a strongly acid profile.

Small areas of Calera, Laughlin, and alluvial soils, as well as soils of the Hugo-Butano association, are included in the Lobitos-Santa Lucia-Gazos soil association. A small acreage of Calera soils occurs in the vicinity of Pilarcitos Lake. These soils have formed from limestone and are calcareous but otherwise resemble the Gazos soils. The Laughlin soils are on siliceous shale in the southeastern uplands. They are grass covered and are grayish brown throughout.

Most of the ridgetops and other less sloping areas of the Lobitos-Santa Lucia-Gazos soil association have been cleared and cultivated at some time in the past. Early cultivation dates from the middle of the 19th century. Peas and flax formerly were grown, but the main crops now are flax, and oats and barley used for grain or hay. Because of rather intensive cultivation on much of the strongly sloping land, sheet erosion has been a factor limiting productivity. Fields that are taken out of cultivation are quickly invaded by coyotebrush or other shrubs if not properly managed. Pastures respond well to management if they are not too steep. Adapted perennial grasses, such as Harding and fescue, do well, particularly when they are fertilized with nitrogen and phosphate. Range and pasture uses appear to be best for most of this soil association, although it is impracticable to remove the shrub cover from the steepest slopes.

Soils of the Marine Terraces, Alluvial Fans, and Flood Plains

These soil associations comprise less than 20 percent of the survey area, but they contain most of the agricultural land and many of the home sites of the survey area. Elevation is generally less than 200 feet, although some of the older terraces are as high as 500 feet. The topography is variable; some of the dissected, higher terraces are steep, and the lower terraces, fans, and flood plains may be nearly level. The average annual rainfall varies somewhat but ranges from 20 to 30 inches. The vegetation consists of grass, with some shrubs on the higher terraces. The parent material in most places is alluvium, some of which was reworked by the ocean and redeposited on marine terraces. Because sedimentary rocks make up most of the uplands, they were the main source of the alluvium. Granitic alluvium is present, however, below the granite in the northern uplands.

Three soil associations have been mapped to show the different soil patterns. They are:

5. Tierra-Colma: Gently sloping to steep, dark-colored, shallow to deep soils on high, dissected marine terraces; composed of weathered products of sedimentary rocks or alluvium from them; under grass and shrubs.
6. Watsonville-Elkhorn: Nearly level to sloping, grayish, shallow to deep soils formed on low marine terraces composed of alluvium from sedimentary rocks or mixed sources; under grass.
7. Tunitas-Lockwood: Nearly level to sloping, grayish or brownish, deep soils on fans and flood plains composed of alluvium from various rocks; under grass with some shrubs and trees.

Tierra-Colma

The Tierra-Colma soil association consists of well-drained to imperfectly drained soils formed on alluvium. The alluvium has a texture of clay loam to sandy loam and was derived from mixed sources. The soils are predominantly moderately steep and steep and are on dissected, elevated marine terraces; vegetation is chiefly grasses and shrubs. Elevation is mostly less than 500 feet, and the range in annual rainfall is mostly between 20 and 30 inches. Summer fogs reduce temperature and increase the moisture supply.

This soil association occupies about 9 percent of the survey area. It occurs below the Lobitos-Santa Lucia-Gazos soil association in the central and southern coastal areas and below the Miramar-Sheridan association in the north. Along the central part of the coast it adjoins the ocean, but to the north and south it is separated from the ocean by lower terraces.

The soils have a thick, very dark gray surface soil that is loam or sandy loam. The Tierra soils are on the more gently sloping terrace remnants under grass; the Colma soils are on the steeper, more erodible side slopes under shrubs. The Tierra soils have a slightly grayer subsurface layer than the Colma soils, and their subsoil is dense clay loam or sandy clay. Their surface soil is strongly acid, and the lower subsoil is slightly acid or neutral. The Colma soils have a medium acid subsoil that contains a little more clay than the slightly acid surface soil. The Tierra soils were developed in marine sediments of mixed origin, whereas the Colma soils were developed in materials weathered from the underlying, slightly consolidated, but otherwise similar, sediments.

From Pigeon Point north to San Gregorio occur small areas of an acid variant of the Tierra soils. These soils resemble those of the Tierra series, although they have a grayish-brown surface soil and a subsoil of yellowish-brown, strongly acid clay. Other areas of more recent

alluvial soils are also located adjacent to drainage channels.

The Tierra soils and the smaller acreage of the more gently sloping Colma soils have been cultivated for a long time. Peas and flax were once grown extensively, but flax, and oats and barley are now grown more commonly for grain or hay. Sheet erosion and gully erosion cause severe problems. The impervious subsoil of the Tierra soils on the higher areas favors rapid runoff in periods of prolonged rainfall. When this runoff collects in channels on the side slopes, gullies develop readily and cut into the underlying soft substratum.

A considerable acreage that was formerly cultivated is now used for pasture. Fertilizing with nitrogen and possibly phosphate, and sowing adapted perennials, such as Harding and fescue grasses, will improve yields of forage. Most areas of Colma soils are covered by shrubs and are excessively steep. They provide only a little grazing.

Watsonville-Elkhorn

The Watsonville-Elkhorn soil association consists of well-drained to imperfectly drained soils that were developed on alluvium of silty clay loam to sandy loam that came from various rock sources. The soils are predominantly nearly level to sloping; the vegetation is grass. Elevation in most places is less than 100 feet, although at Pigeon Point it is more than 300 feet. In general, the lowest terraces are receding slightly each year as the result of erosion by waves. This erosion is particularly active between Miramar and Princeton along Half Moon Bay. The average annual rainfall is about 20 to 25 inches. Fogs are prevalent in summer in the area north of Pigeon Point. Temperatures there tend to be cooler during the growing season than along the coast to the south.

This association occupies about 5 percent of the survey area. It lies adjacent to the coast in all but the central coastal area, which has older, dissected coastal terraces above the shoreline.

The soils of this association have a thick, dark-gray surface soil that is sandy loam, loam, or, in a few places, clay loam. All of the soils have a clay, sandy clay, or sandy clay loam subsoil. The subsoil of the Watsonville soils is dense and nearly impermeable. The Watsonville soils developed on alluvium from sedimentary rocks. They have a medium acid to strongly acid surface soil and a neutral substratum. The Elkhorn soils were developed on alluvium that came from mixed rocks, and the Denison soils, on alluvium from granite. These soils are medium acid or slightly acid. The Elkhorn soils are mainly south of Pescadero, and the Denison soils are north of the town of Half Moon Bay.

A brown subsoil variant of the Lockwood series occurs in some places near the southern tip of the county and has been included in this association. This soil has developed on alluvium from siliceous shales. It has a grayish-brown surface soil and is medium acid or strongly acid throughout.

The Watsonville-Elkhorn soil association contains most of the intensively cultivated soils in the survey area. The Denison soils are used very successfully for growing brussels sprouts, artichokes, flowers, and other intensively managed crops. Because of their impervious subsoil, the Watsonville soils, south of Half Moon Bay, are not well suited to growing deep-rooted crops. Cereals, brussels sprouts, flax, irrigated pasture, and other crops do well on them. The Elkhorn soils, mainly located south of the Coast Highway and Pescadero Road, are used primarily for growing brussels sprouts, cabbage, broccoli, and cauliflower. Soils of the Lockwood variant are used for growing cereal crops and flax. Erosion is a problem on the sloping soils of this association. The soils gully seriously wherever runoff flows into unprotected drainageways.

The soils of this association respond well to fertilizer. The Denison soils have the highest fertility level, followed by the Watsonville and Elkhorn. Additions of nitrogen and usually of phosphate have been profitable on most crops, including pastures. Crop response to potash has not been clearly demonstrated, and further investigation is needed.

Tunitas-Lockwood

The Tunitas-Lockwood soil association consists partly of soils on alluvial fans and flood plains and partly of soils on the terraces of the major streams and on recent marine deposits. Drainage, texture, and parent material of the soils vary widely. The topography ranges from nearly level to sloping; in only a few places is it moderately steep. Elevation in most places is less than 200 feet, although narrow bands of the soils occur along streams at higher elevations. The average annual rainfall is between 20 and 30 inches.

This association occupies about 5 percent of the survey area. Alluvium from sedimentary rocks is the principal constituent of most of the parent materials. North of the town of Half Moon Bay, however, the alluvium is largely of granitic origin, and, in the central part, alluvium from sedimentary rocks has been mixed with that from basic igneous rocks.

The principal soils are members of the Tunitas, Baywood, and Coquille series. They have formed on alluvium of mixed origin—the Lockwood soils, on alluvium from siliceous shales; the Soquel, Corralitos, Botella, and Dublin soils, on alluvium from sedimentary rocks; and the Farallone soils, on alluvium from granitic rocks. In addition, Dune land and Coastal beaches are miscellaneous land types that occupy part of this association.

The Tunitas soils are on old flood plains and fans in the central coastal area. They occupy many slopes and colluvial areas. The soils have a surface soil of medium acid loam or clay loam and a clay subsoil that is about neutral in the upper part and moderately alkaline in the lower part. The profile is very dark gray throughout. The Baywood soils are not extensive. They occur near the junction of Pescadero Road and the Coast Highway. The soil material is wind-modified sand of the coastal plain, and the texture ranges from loamy sand to sandy loam. The Coquille soils, which are at the mouth of Pescadero Creek, are also of small extent. They are very poorly drained and have a peaty surface soil.

The Lockwood soils have a surface soil of medium acid loam and a subsoil of slightly acid loam or clay loam. In most places they contain variable quantities of siliceous shale. The soils occur on fans and flood plains south of Pescadero Creek.

The Soquel soils have a surface soil of dark-colored loam, which in many places overlies a buried soil at moderate depth. The Corralitos soils have a surface soil of grayish-brown loam, sandy loam, or loamy sand, which

commonly is underlain by somewhat coarser soil or may overlie a buried soil at moderate depths. The Soquel and Corralitos soils occur adjacent to stream channels. The Botella soils have a dark-colored surface soil of loam, clay loam, or shaly loam and a subsoil of clay loam. They occur on older terraces than the Soquel soils.

The Farallone soils are dark colored and slightly acid; the texture of the surface soil ranges from loamy coarse sand to loam. The soils occur along the lower courses of streams that drain the soils of the Miramar-Sheridan soil association. The latter are soils on granite in the northern part of the area. Beaches consist of sand and gravel from mixed rock sources that are being reworked by the ocean. Dune land may be stabilized or unstabilized and consists of windblown sand that collects on the leeward side of the beaches. The largest areas are along the seashore in the extreme southern part of the survey area near Franklin and Ano Nuevo Points.

The soils of the Tunitas-Lockwood soil association are managed intensively wherever they are of sufficient extent. Most of the soils are fertile, and yields are enhanced by the use of nitrogen and phosphate. Clayey soils, like those of the Dublin series, require careful handling and cannot be cultivated successfully when they are too wet or too dry.

The Corralitos soils are often inundated by streams unless protected by levees. The Soquel soils in some places are subject to seepage. The Coquille soils require protection by levees and drainage by pumping to lower the water table and make them arable. Once reclaimed, they are valuable soils.

The principal crops grown in the association area are brussels sprouts, artichokes, and other truck crops. Dune land is nonarable and is used mainly for recreation. The sand tends to encroach on fields to the south and east because the prevailing wind blows from the northwest.

Use, Management, and Estimated Yields

This section has four main parts. The first gives facts about agriculture and land use in the county and describes general management practices suitable for the soils; the second explains the capability grouping used by the Soil Conservation Service and gives suggestions for managing the soils in each capability group; the third gives the Storie index rating for each of the soils and relative suitability for general intensive agriculture for the principal crops in the Area; the fourth gives estimated yields; and the fifth discusses engineering interpretations.

Agriculture

The climate of the San Mateo Area is suitable for the growing of specialty crops. In addition, a large acreage each year is used for growing cereals, flax, and hay crops, and for dryland and irrigated pastures. The following section describes the history of agriculture in the county, the present land use, and important farming practices suitable for the soils of the Area.

Agricultural history

Missions, established in early times, were important in bringing agriculture to the area that is now San Mateo County. San Francisco Mission was founded in 1776, and Santa Cruz Mission, in 1792. These missions lie outside of San Mateo County. Within 20 years of their founding, however, each had its largest stock ranches in the coastal section that is now San Mateo County.

Along the coast, the area between Pedro Mountain and New Year's Point (Ano Nuevo Point) was quite isolated. The trail over Pedro Mountain could be used for driving cattle, but it was dangerous; the coastal trail south of New Year's Point went along the beach but could be traveled only at low tide. There were two or three difficult horse trails over the Santa Cruz Mountains, through the center of the county. Many of these trails were through territory occupied by Indians. In spite of these difficulties, the relatively well watered coastal area attracted a fairly heavy settlement in Spanish times.

Land use

The climate of the San Mateo Area is suitable for certain specialty crops that can be grown in only a few areas. For example, in 1953, this area produced 22 percent of the artichokes, 28 percent of the brussels sprouts, 95 percent of the heather, and nearly all of the strawflowers grown in the United States.

Because of topography and natural barriers that divide the rural areas into several communities, there is a rather wide diversity of agriculture. Much of the upland, especially in the southern part of the Area, is covered by coniferous forests, and a number of logging companies are actively operating there. The more open grasslands, free of excess brush, are grazed by beef and dairy cattle, and a few of the hilltops and more gently sloping hillsides are planted to grain, grain hay, and flax. The benches along the coast and in the major valleys where irrigation water is available are used intensively for a variety of vegetable crops, mainly artichokes and brussels sprouts, and for flowers and irrigated pasture. Where water is not available, the chief crops are hay, grain, flax, peas, and horsebeans.

PASTURES

Dryland pastures provide the most effective ground cover for stabilizing the soils and are capable of yielding large quantities of forage. In contrast to areas where rainfall is less and the annual yield of forage varies considerably, this Area, with 20 to 45 inches of precipitation, assures good grazing year after year. Much of the present pastureland has been heavily farmed and grazed in the past, resulting in somewhat lowered fertility. It has been shown that nitrogen and, in some places, phosphate fertilizer will encourage early growth and greatly stimulate production of forage.

In places, where soil and slope are favorable, mixtures of perennial grasses and legumes have been seeded; yields of forage have thus been greatly increased, and the period when green feed is available has been extended beyond the time when native annual plants dry up. Some of the best grasses and legumes for dryland pastures are Harding grass, fescue, subterranean clover, and birdsfoot trefoil.

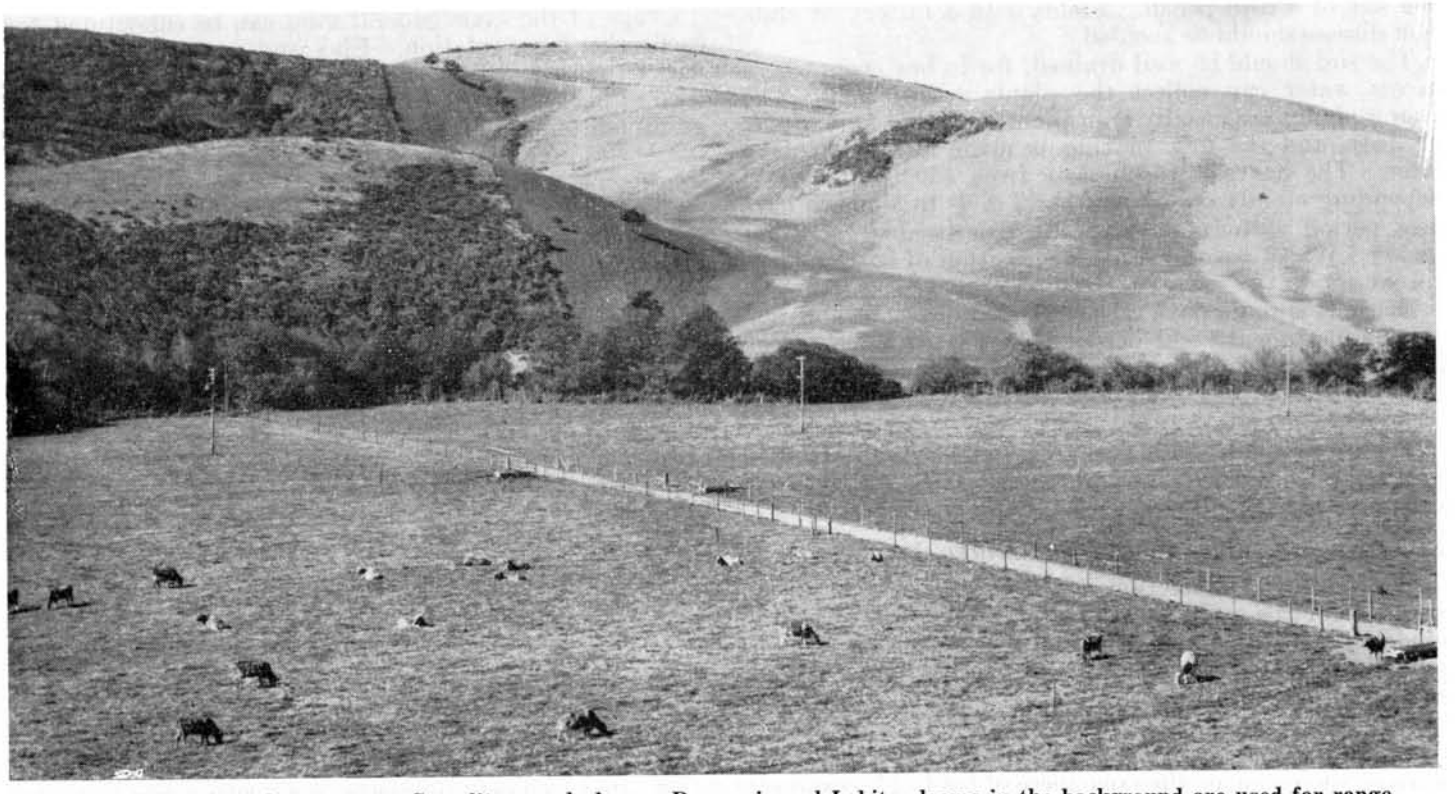


Figure 7.—**Irrigated pasture on Corralitos sandy loam. Pomponio and Lobitos loams in the background are used for range.**

Because of the excellent climate, improved pastures produce high yields of green forage more than 7 months of the year. Perennial plants are well suited on many of the soils. On steep slopes, however, erosion is likely to limit the establishment of perennial cover. To date, about 5,000 acres has been seeded to dryland permanent pasture. As a result, erosion has been reduced greatly in contrast to that on similar land that is cultivated.

Irrigated pastures are located on the coastal benches and on alluvial plains along creeks and streams. Irrigation water comes from streams, storage ponds, and wells. Yields are high, and when these pastures are managed with those on adjacent drylands, they provide green feed during the time when the range plants are dry. An irrigated pasture is shown in figure 7.

FIELD CROPS

Each year, many thousands of acres are planted to cereals, flax, and hay crops. The cereals are mainly oats and barley, and little wheat is grown. Vetch and cereals are frequently seeded together. The vetch is harvested for seed.

The common practice is to prepare fields by plowing and harrowing after the first rains of the season. Oats are usually planted in December, barley early in March, and flax somewhat later. Oats and barley are drilled or broadcast and harrowed. Flax is drilled. Grain crops are harvested mechanically in August or September, and the flax, in October.

Yields of cereals are not particularly high. Many of the soils planted to these crops have been farmed for many years, and erosion and lowered fertility are the main causes of reduced yields.

TRUCK CROPS

Many kinds of truck crops are grown, but, except for artichokes and brussels sprouts, they occupy only a small acreage. Because of the ideal climate, these two crops are grown on a large acreage. The truck crops grown less extensively are broccoli, cauliflower, beets, cabbage, kale, lettuce, fresh peas, potatoes, radishes, and spinach.

Globe artichokes require a climate that is moist in summer and nearly frost free in winter. They also need an adequate supply of irrigation water. The soil should be deep, fertile, and well drained. Climate, however, is more important than soil fertility, for poor soil, as a rule, can be improved by fertilization.

The artichoke plants are selected from offshoots or root sections of plants that have desirable characteristics. They are usually selected during the period from November to March. The plants are generally set in rows 8 feet apart and are spaced 6 feet apart in the row. Applications of fertilizer, mainly of nitrogen compounds, are beneficial. Organic fertilizer usually gives best results and is used in considerable quantities. Harvesting begins in fall, and pickings are made weekly until April or May. Peak production comes early in spring. The crop is important commercially, especially in market areas where there are people of Latin, or Southern European, origin. Demand for canned artichokes among the general public is increasing.

Brussels sprouts belong to the cabbage (Crucifer) family. Fields are established mostly by transplanting young plants that have been grown in seedbeds. The ideal plant for setting is one that is 7 to 8 inches tall and free from disease. It has a stocky, tough stem about

the size of a lead pencil. Fields with a history of clubroot disease should be avoided.

The soil should be well drained, for in low spots where excess water can collect the plants will drown. The young plants are usually transplanted during May, June, or July, and the first picking is made about 100 days later. The harvest season lasts from 150 to 180 days, depending mainly on the weather. A 4- to 5-month harvest period with cool temperatures is needed for good yields. Warm weather causes formation of soft or open sprouts.

Brussels sprouts have relatively shallow roots, and few roots penetrate the soil deeper than 2½ to 3 feet. For good growth, the plants need water throughout the growing season.

FRUIT CROPS

There are a few apple orchards, but not much fruit is grown. The orchards are in small, fertile valleys east of San Gregorio and Pescadero.

Important practices for the San Mateo Area

The following subsection describes cropping practices suitable for the soils of the San Mateo Area. These include rotation of crops, growing of cover crops, stubble mulching, chemical control of brush, and range improvement.

CROP ROTATION

Crop rotation consists of growing different crops in recurring succession on the same piece of land. An example of a simple rotation is the planting of flax and grain in alternate years on one field. Such a rotation, however, lowers the content of organic matter and plant nutrients in the soil and brings about a gradual deterioration of soil friability and tilth. To maintain soil organic matter, fertility, and soil structure and also to aid in controlling weeds, diseases, and insects, it is usually necessary to grow other kinds of crops besides flax and grain in rotation.

Legumes and grasses are grown in rotation with flax and grain. These crops are close growing, and they have beneficial effects on the soil. They add organic matter and nitrogen, especially if residues are returned to the soil. The extensive root systems improve soil structure and tilth. These soil improvements, in turn, improve yields of flax and grain and are especially helpful on soils of the marine terraces—the Tierra, Watsonville, and Elkhorn.

Rotating crops also aids in controlling weeds. Cutting annual weeds close to the ground before their seed ripens will reduce revegetation. Several opportunities to do this occur in a rotation of a row crop, grain, and a legume. Most of the noxious weeds are perennials, however, and control of them is more difficult.

The rotation to be used on a farm is selected on the basis of the nature and pattern of the soils and on the organization of the farm. By proper selection of grain crops, row crops, and grasses or legumes, a good rotation can be developed for any soil that is suitable for cultivation.

The proportion of legumes and other close-growing crops needed in a rotation depends on the slope and other soil limitations. Cropping systems for soils in the different capability units are described in the section, Management by Capability Units.

Crops of the same general kind can be substituted for each other in a rotation. Flax and grain, for example, may be substituted for each other; and horsebeans may be used in place of vetch. Minor changes are often necessary as circumstances of the market and farm shift.

GROWING OF COVER CROPS

A soil is most susceptible to erosion if it is bare of vegetation during the rainy period. A soil low in organic matter is more easily eroded than one high in organic matter. If rain falls when the soil is bare, some erosion occurs, even if the slope is gentle.

A cover crop can be defined as any crop that provides good ground cover, breaks the force of falling raindrops, and thus helps prevent erosion. The term is generally applied to those crops that are planted especially to check erosion and to add organic matter.

A green-manure crop is one that is grown to be plowed or otherwise worked into the soil.

The principal advantages of a cover crop are that it—

1. Reduces runoff of rain and conserves rainfall.
2. Prevents excessive erosion of the soil.
3. Improves soil tilth by adding organic matter to the soil and loosening up the subsurface of the soil with deep-growing roots.
4. Reduces leaching of plant nutrients, especially of nitrates.
5. When plowed under, aids in the liberation of mineral plant nutrients.
6. May provide pasture late in fall, in winter, and early in spring.
7. Protects newly constructed earth fills, terraces, or other structures.
8. Increases yields of grain, flax, and other crops in the farming system.
9. Increases the infiltration of water into the soil.

STUBBLE MULCHING

Tillage that keeps crop residues on the surface and maintains a granular or cloddy surface soil is effective in conserving water and in helping to control erosion (fig. 8).

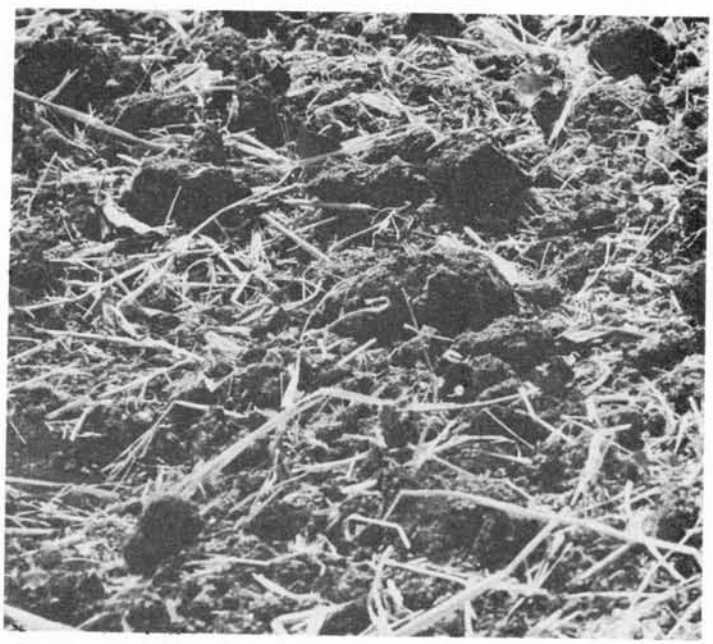


Figure 8.—**A mulch of crop residues improves tilth and helps protect against erosion.**

Stubble mulching is one of the best ways to conserve soil and moisture on land that is in fallow, and to protect cropland during the period in which a seedbed is prepared for the succeeding crop.

Stubble-mulch tillage breaks the impact of raindrops by breaking each of them into many smaller droplets that can enter the soil without moving or splashing much of it. The impact of ordinary rain will easily seal a soil that has weak structure, especially the surface soil of those over marine sediments, such as soils of the Watsonville, Tierra, and Elkhorn series. The practice is of particular importance in the management of these soils. The stubble, while decomposing, uses a small amount of soil nitrogen, and some extra nitrogen in the fertilizer may, therefore, be needed.

CHEMICAL CONTROL OF BRUSH

About 85,000 acres, or more than half the agricultural land in the San Mateo Area, is covered with brush or is subject to encroachment of brush. The principal species is coyotebrush.

Chemical eradication, which kills the brush in place without cultivation, frees the land for more productive use. After the brush has been killed, volunteer stands of ryegrass, burclover, and bromegrass produce good forage. In areas of heavy brush, burning and reseeding after chemicals have been applied will generally produce excellent pastures. Some inaccessible areas have been sprayed from helicopters. Ground machines give excellent control in places where they can be used.

RANGE IMPROVEMENT

Rangeland in this Area provides green feed in spring and early in summer. Some green feed is also available in winter if rains occur early enough and temperatures are favorable. Dry feed for late summer and fall is supplied by grasses and legumes produced in spring. To extend the green-feed period, a three-point program is suggested by nurserymen at the Pleasanton Plant Materials Center, Pleasanton, Calif. The plan is based on numerous trials conducted on dryland pastures throughout the State. The plan involves essentially the use of the proper kinds and amounts of fertilizer, seeding to adapted perennial grasses and legumes, and other good management. Management of rangeland is discussed in the section, Management by Capability Units.

Fertilizer of the right kind, applied at the right time, will increase production of forage on the range. Usually, in the early part of the winter grazing season, there is a shortage of green feed. Available nitrogen or nitrogen plus phosphorus fertilizer increases greatly the growth of grasses during the cool winter months.

Where total feed production is low, fertilizer will increase the total yield materially. When yields are low, quality of the forage is likely to be poor also. Fertilizer that increases the growth of legumes and desirable annual grasses will also improve the quality of the dry feed for summer and fall use. Fertilization stimulates the growth of desirable grasses and legumes at the expense of weeds.

Where the slope is not too steep and the soil is not too stony, the range may be suitable for seeding to a mixture of perennial grasses and legumes (fig. 9). Harding grass is well suited to many soils of this area. The soil map shows the location of the soils, and the section of this report, Management by Capability Units, tells which of them can be improved by reseeding.

***Figure 9.*—A sloping field, formerly used for grain and flax, will be seeded to a mixture of perennial grasses and legumes for grazing. The light-colored areas show where gullies have been filled.**

A dryland pasture of perennial grasses, such as Harding grass, can provide adequate green forage as much as 3 months before the annual grasses are ready for grazing. Perennial grasses also can provide green feed on the range for 1½ months after annual plants become dry. With green feed available for a longer season, the need for feeding protein supplements is reduced. A pasture of improved grasses produces forage at a more uniform level in good and bad years and increases grazing capacity of the range.

A tested method of establishing a stand of pasture plants by seeding a Harding grass-legume pasture mixture is as follows: Select one of the best sites. Many of these are in capability class III or IV. Disk the soil in spring before the earliest annual plants produce seed. Plant sudangrass or keep the field in fallow. After the first fall rain, disk the field and roll it to prepare a firm seedbed. Drill a mixture of Harding grass and legume seeds, one-half inch deep, immediately after the seedbed is prepared. The following year, clip the field for control of weeds but do not graze it until about the middle of December.

Capability Groups of Soils

Capability grouping is a system of classification to show the relative suitability of soils for crops, grazing, forestry, and wildlife. It is a practical grouping based on the needs, limitations, and risks of damage to the soils and also on their response to management. There are three levels above the soil mapping unit in this grouping—the capability unit, the subclass, and the class.

The capability unit, which can also be called a management group of soils, is the first level in which kinds

of soils are grouped in this system. A capability unit is ordinarily a group of soils that are similar in management needs, in risk of damage, and in general suitability for use. It can consist of just one soil.

The next broader grouping, the subclass, indicates the dominant kind of limitation. The letter symbol "e" means that the main limiting factor is risk of erosion if the plant cover is not maintained. The symbol "w" means that excess water retards plant growth or interferes with cultivation. The symbol "s" means that the soils are shallow, droughty, or low in fertility.

The broadest grouping, the class, is identified by Roman numerals. All the soils in one class have limitations and management problems of about the same degree, but they can be of different kinds. There are eight of these general classes in this system. All of the classes, except class I, may have one or more subclasses.

In classes I, II, and III are soils that are suitable for annual or periodic cultivation of the usual annual or short-lived crops. Soils in some of the other classes, however, are well suited to certain special crops, such as rice or cranberries, and to some fruit, nut, or ornamental plants.

Class I soils are those that have the widest range of use and the least risk of damage. They are level or nearly level, productive, well drained, and easy to work. They can be cultivated with almost no risk of erosion and will remain productive if managed with normal care.

Class II soils can be cultivated regularly, but they do not have quite so wide a range of suitability as class I soils. Some class II soils are gently sloping and, consequently, need moderate care to prevent erosion. Other soils in class II may be slightly droughty, slightly wet, or somewhat limited in depth.

Class III soils can be cropped regularly, but they have a narrower range of use. They need more careful management than the soils of class II.

In class IV are soils that should be cultivated only under very careful management; for many soils this means only occasionally in a system that includes several years of hay or other protective crops.

In classes V, VI, and VII are soils that normally should not be cultivated for annual or short-lived crops but that can be used for pasture, for woodland, or for plants that shelter wildlife. Some of the soils in these classes, with substantial land-forming or reclamation treatment, can be made suitable for special crops, or even changed to another capability class.

Class V soils are nearly level or gently sloping and are not likely to erode, but they are droughty, wet, low in fertility, or otherwise unsuitable for cultivation. There are none in this Area.

Class VI soils have severe limitations that make them generally unsuited to cultivation and limit their use largely to pasture or range, woodland, or wildlife. Some soils in class VI can, without damage, be cultivated enough so that fruit trees, forest trees, or ornamental plants can be set out or pasture crops seeded.

Class VII soils are more limited than class VI, and, as a rule, provide only poor to fair yields of forage. Yields of forest products may be fair to high. The soils have characteristics that severely limit their use for pasture and, in some places, for woodland.

In class VIII are soils that have practically no agricultural use. Some areas have value for watershed protection, wildlife shelter, or scenery.

The soils of the surveyed area have been placed in capability classes, subclasses, and units as shown in the list that follows. A capability unit is usually a group of soils, similar in the main features that affect their use, conservation, and responses to management, within one capability class and subclass.

Capability units in California are given numbers that suggest the chief kind of limitation responsible for placement of the soils in the capability class and subclass. For this reason, units within the subclasses are not numbered consecutively, and their symbols are a partial key to some of the soil features. The numerals used to designate units within the classes and subclasses are these:

1. An erosion hazard, actual or potential.
2. A problem or limitation of wetness because of a high water table or seepage.
3. A problem or limitation of depth of soil; roots penetrate only to shallow or moderately shallow depths.
4. A problem or limitation of coarse-textured soil.
5. A problem or limitation of fine-textured soil.
6. Soil and climate limit the use mostly to woodland or forest.

The capability classes, subclasses, and units in the Area are the following:

Class I.—Soils that are very good for crops and have few limitations that restrict their use.
- Unit I–1.—Deep or very deep, well-drained soils on alluvial fans and flood plains.

Class II.—Soils that have some limitations that reduce the choice of plants or that require some conservation practices.
- Subclass IIe.—Soils that are likely to erode if not protected.
  - Unit IIe–1.—Gently sloping, deep to very deep, well-drained soils on recent alluvial fans or flood plains.
- Subclass IIs.—Soils that have moderate limitations because of depth or low water-holding capacity.
  - Units IIs–3.—Nearly level or gently sloping, moderately deep or deep soils that have a compact subsoil.
  - Unit IIs–4.—Moderately deep to very deep, somewhat coarse-textured soils over weathered granite or sedimentary rocks.
- Subclass IIw.—Soils that have moderate limitations because of excess water.
  - Unit IIw–2.—Soils on low flood plains near streams.

Class III.—Soils that have severe limitations that reduce the choice of plants, or that require special conservation practices, or both.
- Subclass IIIe.—Soils that have a severe hazard of erosion if they are tilled and not protected.
  - Unit IIIe–1.—Well-drained, sloping soils.
  - Unit IIIe–3.—Shallow to moderately deep, sloping soils on old terraces or shale uplands.
  - Unit IIIe–4.—Moderately deep or deep, sloping soils in alluvium derived from granitic rocks or sandy beaches.

Subclass IIIs.—Soils that have severe limitations because of low moisture capacity and fertility.
Unit IIIs–3.—Shallow to moderately deep soils underlain by a slowly or very slowly permeable subsoil.
Subclass IIIw.—Soils that are severely limited by excess water.
Unit IIIw–2.—Soils that are poorly drained because of their low position, slow internal drainage, or a combination of these.

Class IV.—Soils with very severe limitations that restrict the choice of plants, that require very careful management, or both.
Subclass IVe.—Soils very severely limited by risk of erosion if they are not protected.
Unit IVe–1.—Moderately steep soils.
Unit IVe–3.—Moderately steep, shallow or moderately deep soils.
Unit IVe–5.—Moderately steep soils that are underlain by weathered basalt or shale.
Unit IVe–6.—Deep or moderately deep, moderately steep, coarse-textured soils.

Class VI.—Soils that have severe limitations that make them generally unsuited to cultivation and that limit their use largely to pasture, range, woodland, or food and cover for wildlife.
Subclass VIe.—Soils not suitable for cultivation and limited chiefly by the hazard of erosion.
Unit VIe–1.—Steep soils on uplands, mainly over sedimentary rocks.
Unit VIe–3.—Steep, eroded soils on marine terraces.
Unit VIe–4.—Moderately coarse textured, steep or eroded soils on weathered granite.
Unit VIe–5.—Steep, shallow to deep loam or clay loam soils over basalt rock or shale.
Unit VIe–6.—Steep, erodible soils, chiefly on sandstone or shale.

Class VII.—Soils that have very severe limitations that make them unsuited to cultivation and that restrict their use largely to grazing, woodland, or wildlife.
Subclass VIIe.—Soils very severely limited by risk of erosion if not protected.
Unit VIIe–1.—Very steep soils over sandstone, shale, basalt, or serpentine rocks.
Unit VIIe–3.—Very steep soils on loosely consolidated sediments of marine terraces.
Unit VIIe–4.—Steep, or very steep, moderately coarse textured soils underlain by weathered granite.
Unit VIIe–5.—Very steep loam or clay loam soils, underlain by basalt or shale.
Unit VIIe–6.—Very steep soils, mainly on shale or sandstone.

Class VIII.—Soils and land types with limitations that preclude their use for commercial plants and that restrict their use to recreation, wildlife, water supply, or esthetic purposes.
Subclass VIIIe.—Soils or land types that support little vegetation.
Unit VIIIe–1.—Miscellaneous land types and rough broken land.

Management by capability units

The productivity and responses of a soil depend on many factors, especially on the nature of the soil, on the climate in which it is located, and on the management it receives. Soil characteristics and climate cannot be changed readily. Management, on the other hand, is subject to control. Changes in the management of some soils can drastically change the quality and yields the crop produces. Recurring practices in management will establish a trend toward improvement, maintenance, or depletion of the soil in a field.

A good system of soil management is likely to consist of a combination of several practices, among them a good cropping system, the use of fertilizer, and cultivation on the contour or across the slope. The effectiveness of any one practice is often dependent upon other practices. For example, a diversion system for disposal of storm water may cause gullying unless the water is directed into an adequate grass waterway or other suitable channel.

Because of the wide variety of soil and climatic factors, it is desirable to group many of these combinations of practices into units for ease of handling and treating. This has been done in this section. This section contains a description of each capability unit, a list of the soils in it, and some suggestions for use and management of the soils. Further information about each kind of soil is given in the section, Descriptions of Soils.

CAPABILITY UNIT I–1

These are deep to very deep, well-drained soils on alluvial fans and flood plains. The texture of the surface soil ranges from loam to clay loam. Permeability ranges from moderate to moderately slow.

The soils consist of deep, uniform deposits of alluvial materials. Those north of Half Moon Bay have formed in alluvium from granitic rock or in mixed materials from granitic and sedimentary rocks. Those south of Half Moon Bay have formed in alluvium mostly from sedimentary rocks. All of the soils are fertile, easy or fairly easy to work, and have good to very high water-holding capacity.

The soils in this unit are:

(BcA) Botella clay loam, nearly level
(FaA) Farallone loam, nearly level.
(SkA) Soquel loam, nearly level.
(SoA) Soquel loam, over clay, nearly level.

Use and management.—The soils of this unit are highly productive. Fertilization, mainly with nitrogen, is needed for maximum yields. All the crops suited to the climate of the Area are suited to these soils.

The soils are farmed most intensively to artichokes and brussels sprouts. Intensive cultivation has caused the organic matter to be depleted in many of the soils. Good management is needed to restore and maintain high yields.

Organic matter can be maintained if a green-manure crop is grown in the rotation 1 year in 3 to 5 years. Irrigated pasture, hay crops, or legumes and grasses may be used in the rotation. All crop residues should be returned to the soil. Barnyard manure and refuse from stables or other sources will add organic matter and plant nutrients.

These soils produce good irrigated pasture. Each pasture should be divided into several units for rotation grazing, to allow the plants to recover. Grazing the soils when

wet ought to be avoided so they will not be compacted. Annual applications of fertilizer should be made as indicated by soil tests.

These soils may be irrigated by furrows, borders, or sprinklers. The system should be designed to fit the soil and the crop. The length of runs for furrows and borders and the rate of application by sprinklers will vary with the soil texture, the head of water, and the slope. The soils are deep or very deep, and there are no problems in land leveling. Water needs to be applied to wet the soil evenly to the rooting depth of the crop being grown. Wasting water by overirrigating should be avoided. A soil auger or shovel can be used to check the depth that water penetrates.

CAPABILITY UNIT IIe–1

These are deep to very deep, well-drained, gently sloping soils on recent alluvial fans or on the first and second flood plains of streams. The texture of the surface soil ranges from loam to clay loam. In general, permeability ranges from moderate to moderately slow. Because of its small extent, Dublin clay, gently sloping, however, is included with the soils of this unit. It is a slowly permeable soil.

North of Half Moon Bay, the alluvium from which these soils formed has as its source the granitic rocks of the Montara Mountains; in some places it also contains some alluvium from sedimentary rocks. South of Half Moon Bay, these soils are composed of alluvium, mostly from sedimentary rocks.

The soils are fertile, and they are well drained except for occasional seeps. They have good to very high water-holding capacity, and all but the Dublin soil are easy or fairly easy to work.

The soils in this unit are:

(BcB) Botella clay loam, gently sloping.
(BeB) Botella loam, gently sloping.
(DmB) Denison loam, gently sloping.
(DuB) Dublin clay, gently sloping.
(FaB) Farallone loam, gently sloping.
(HvB) Hugo and Josephine loams, very deep, gently sloping.
(LmB) Lockwood loam, gently sloping.
(LsB) Lockwood shaly loam, gently sloping.
(SkB) Soquel loam, gently sloping.

Use and Management.—These soils are suitable for a wide range of crops that will grow in this climate, including irrigated and nonirrigated row crops, irrigated pasture, and a few orchard crops. There are minor problems of management arising out of irrigation and some hazards of erosion unless precautions are taken.

Sheet erosion can be controlled by tilling across the slope, returning crop residues to the soil, and applying other easy practices. Concentrated water from canyons and other higher areas may require diversions and a water-disposal system to prevent gullying. Water for irrigation may be applied by borders, furrows, or sprinklers (fig. 10). The irrigation system should be planned and the water controlled so as not to cause erosion. A system for disposal of tail water needs to be provided.

The management practices discussed under unit I–1 also apply to these soils. Deep cuts can be made when leveling or smoothing because the soil profiles are deep.

CAPABILITY UNIT IIs–3

Soils in this unit are nearly level or gently sloping and are moderately deep or deep. The subsoil is compact enough to make a minor depth limitation. The effective depth of rooting is moderately deep or deep. The moderately dense subsoil rests on either unconsolidated marine sediments or on old valley fill materials. The texture of the surface soil ranges from coarse sandy loam to clay loam, and permeability, from moderately slow to slow.

***Figure 10.*—Sprinkler irrigation on a gently sloping soil of capability unit IIe–1.**

Because of the weak structure in the surface layer of some of the soils on marine terraces, infiltration of water is sometimes considerably reduced. The soil often seals and crusts after drying. Some wet spots occasionally occur. The finer textured soils of the alluvial terraces are fertile and productive and tend to be less susceptible to erosion than the others in this unit. The Denison soils have a moderately fine to fine textured subsoil that causes a minor internal drainage problem. These soils are located along elevated stream-cut valleys and ocean benches near the ocean. A few occur at the bases of slopes and in swales.

The soils in this unit are:

(DcA) Denison clay loam, nearly level.
(DmA) Denison loam, nearly level.
(DeA) Denison coarse sandy loam, nearly level.
(EtB) Elkhorn sandy loam, thick surface, gently sloping.
(TuA) Tunitas clay loam, nearly level.
(TuB) Tunitas clay loam, gently sloping.
(TwA) Tunitas clay loam, nearly level, imperfectly drained.
(TwB) Tunitas clay loam, gently sloping, imperfectly drained.
(TxA) Tunitas loam, nearly level.
(TxB) Tunitas loam, gently sloping.

Use and Management.—These soils are suited to a fairly wide range of crops, but their depth is unfavorable for some deep-rooted plants. Sprinkler irrigation is the most desirable method of applying water in most places, but if a field is nearly level and the texture and depth of the soil are uniform, a furrow or border system of irrigation may be adequate. If furrow or border irrigation is used, a system for disposing of tail water should be provided.

Because of the weak structure of many of the surface soils, good soil management practices are needed. If row crops are grown, a green-manure crop should be included in the rotation once in 2 to 4 years. Other

methods for improving the soil include the use of a grass-legume seeding or a hay crop in the rotation. All crop residues should be returned to the soil. It is well to add manure when available. Cross-slope cultivation and other minor erosion-control practices will help to check erosion on the gently sloping soils. Wet spots need to be drained so that they can be tilled more easily. Other desirable management practices are described under unit I–1.

CAPABILITY UNIT IIs–4

This unit consists of moderately deep to very deep, nearly level to gently sloping soils formed from alluvium derived from weathered granitic and sedimentary rocks. The surface soil ranges from loamy coarse sand to sandy loam. Permeability is rapid to very rapid. In some places the soils are highly stratified; care must be taken not to uncover layers of sand and gravel in leveling. Underlying coarse-textured strata in some places contain water that is likely to cause seeps, especially if the soil is near a stream and only slightly above the level of the stream channel.

The soils are:

- (BaB2) Baywood sandy loam, gently sloping, eroded.
- (CsA) Corralitos sandy loam, nearly level.
- (CsB) Corralitos sandy loam, gently sloping.
- (CwB) Corralitos sandy loam, over gravel, gently sloping.
- (CuA) Corralitos sandy loam, over gravel, nearly level, imperfectly drained.
- (CrA) Corralitos loamy sand, nearly level, imperfectly drained.
- (FcA) Farallone coarse sandy loam, nearly level.
- (FcB) Farallone coarse sandy loam, gently sloping.
- (FyB) Farallone loamy coarse sand, gently sloping.

Use and management.—The soils of this unit are suited to irrigated truck crops, row crops, and flowers, as well as to irrigated pasture. The droughtiness of the soils makes frequent irrigation necessary. Excess irrigation water percolates rapidly below the root zone, where it becomes unavailable to the crop. Short furrows, borders, or a sprinkler irrigation system are the most satisfactory to use.

Organic matter is low in these soils, and green-manure crops are needed in the rotation. All crop residues should be returned to the soil. Soil management practices discussed under capability unit IIe–1 apply to these soils.

Crops on these soils respond to nitrogen fertilizer, and some crops also respond well to phosphate.

CAPABILITY UNIT IIw–2

These are nearly level or gently sloping soils on flood plains at low elevations. The texture of the surface soil ranges from coarse sandy loam to clay. Permeability ranges from rapid to slow. Drainage is impeded because of fine texture, low position, or nearness to streams where seepage may occur. The Dublin clay soils are listed as part of this unit, even though they are finer textured than the others. They are minor in extent.

Free water may be present part of the time in the soil profile, causing delay in cultivating and planting or injury to crops that may be growing during the rainy season. Cultivating the fine-textured Dublin soils while they are excessively wet will cause compaction and cloddiness, leading to increasingly poor drainage.

The soils of this unit are generally fertile. They are in the lower basins of many of the small coastal valleys, in swale areas, or on fine-textured, high, alluvial flood plains. North of Half Moon Bay, granitic rock is the main source of the parent material. South of Half Moon Bay, the parent material is generally mixed alluvium, mostly from sedimentary rocks.

The Farallone soil is likely to be somewhat droughty late in the year when the excess water has subsided. Although this soil occurs only in small tracts, it is widely distributed throughout the Area.

The following soils are in this unit:

- (BdA) Botella loam, nearly level, imperfectly drained.
- (BdB) Botella loam, gently sloping, imperfectly drained.
- (CtA) Corralitos sandy loam, nearly level, imperfectly drained.
- (CtB) Corralitos sandy loam, gently sloping, imperfectly drained.
- (CyA) Corralitos sandy loam, over clay, nearly level, imperfectly drained.
- (DdA) Denison clay loam, nearly level, imperfectly drained.
- (DuA) Dublin clay, nearly level.
- (DwA) Dublin clay, nearly level, imperfectly drained.
- (DwB) Dublin clay, gently sloping, imperfectly drained.
- (FsB) Farallone coarse sandy loam, over coarse sands, gently sloping, seeped.
- (LwB) Lockwood loam, gently sloping, seeped.
- (LoA) Lockwood loam, nearly level, imperfectly drained.
- (SsA) Soquel loam, over clay, nearly level, imperfectly drained.
- (SmA) Soquel loam, nearly level, imperfectly drained.

Use and management.—The soils of this unit are well suited to shallow-rooted crops and, if drainage is provided, to a wide range of other crops. Simple practices are needed to drain the soil or to prevent flooding. Because of their low position and imperfect drainage, excess water from higher areas should be diverted into suitable outlets (fig. 11). Mole drains, open drains, or tile drains will help remove excess water.

These soils are productive, and good yields may be expected. Irrigation must be controlled to prevent pond-

***Figure 11.*—Drainage of the wet soils in capability unit IIw–2 will permit a greater variety of crops and increased yields.**

ing and waterlogging. Sprinkler irrigation systems can control best the quantity of water applied. If water is applied in furrows, care should be taken to put on the right amount and not too much.

To maintain soil fertility and good soil structure, a grass-legume crop should be grown in the rotation once in 3 or 4 years. A green-manure crop will add needed organic matter. If a plowpan is present, subsoiling will increase permeability. All crop residues should be returned to the soil. A field that is used for irrigated pasture ought not to be grazed when it is too wet, or the soil will be compacted.

CAPABILITY UNIT IIIe–1

This unit consists of well-drained, sloping soils. The texture of the surface soil ranges from coarse sandy loam to clay loam. Depth of soil ranges from moderately deep to very deep, and permeability, from moderate to slow. The underlying materials are deep, alluvial deposits or bedrock.

The sloping Dublin and Sweeney soils are finer textured than the others in this unit, but they fit better in it than in any other unit. A few sloping, deep soils on alluvial and marine terraces are also in this unit. Some wet spots and seeps are present.

These soils are similar to those in capability unit IIe–1 but are steeper and, in most places where bedrock is the parent material, they are shallower. Selection of suitable crops is more limited. The vegetation on the Hugo soils is mainly coniferous trees, and the vegetation on the other soils is brush and grasses.

The soils in this unit are:

(BcC2)	Botella clay loam, sloping, eroded.
(BeC2)	Botella loam, sloping, eroded.
(BoC)	Botella loam, sloping, seeped.
(CcC2)	Cayucos clay loam, sloping, eroded.
(CdC2)	Cayucos clay loam, deep, sloping, eroded.
(DmC)	Denison loam, sloping.
(DuC2)	Dublin clay, sloping, eroded.
(EtC2)	Elkhorn sandy loam, thick surface, sloping, eroded.
(GbC2)	Gazos loam, sloping, eroded.
(GdC2)	Gazos loam, dark, sloping, eroded.
(GlB)	Gazos-Lobitos silt loams, gently sloping.
(GlC2)	Gazos-Lobitos silt loams, sloping, eroded.
(GcC2)	Gazos (dark phase)-Calera loams, sloping, eroded.
(HyC2)	Hugo and Josephine sandy loams, sloping, eroded.
(HzC)	Hugo and Josephine sandy loams, very deep, sloping.
(HuC)	Hugo and Josephine loams, sloping.
(HvC)	Hugo and Josephine loams, very deep, sloping.
(LaC2)	Laughlin loam, sloping, eroded.
(LbC2)	Laughlin-Sweeney loams, sloping, eroded.
(LlC2)	Lobitos loam, sloping, eroded.
(LdC2)	Lobitos loam, deep, sloping, eroded.
(LfC2)	Lobitos fine sandy loam, sloping, eroded.
(LmC2)	Lockwood loam, sloping, eroded.
(LwC)	Lockwood loam, sloping, seeped.
(LyC2)	Los Gatos clay loam, sloping, eroded.
(MmC2)	Miramar coarse sandy loam, sloping, eroded.
(SaC2)	Santa Lucia loam, sloping, eroded.
(SkC2)	Soquel loam, sloping, eroded.
(SwC2)	Sweeney clay loam, sloping, eroded.
(SxC2)	Sweeney clay loam, deep, sloping, eroded.
(StC)	Sweeney clay, sloping.
(SyC2)	Sweeney loam, sloping, eroded.
(WtB2)	Watsonville sandy loam, thick surface, gently sloping, eroded.

Use and management.—These are fairly good soils. They are best suited to range use but are also suitable for the production of hay crops, grain, and flax.

***Figure 12.*—Tillage on the contour will help control erosion on the soils of capability unit IIIe–1.**

Because of slope, major soil conservation practices are needed to prevent sheet and gully erosion. All tillage and planting operations should be on the contour or across the slope (fig. 12). On fields used for grain, hay crops, or flax, a green-manure crop should be planted every 3 or 4 years. All crop residues should be returned to the soil. Grain and flax residues, if allowed to remain on the soil surface as a mulch, will greatly aid in reducing erosion.

If irrigation is practiced, a sprinkler system is best. Waterways and protected outlets should be provided. Subsoiling on the contour when the soil is dry will help to increase the absorption of water and will aid in decreasing runoff. Measures to control brush may be needed, especially if more intensive use of the soils is planned. Plants grown on these soils respond to nitrogen fertilizer. Often phosphate is also needed.

The Hugo soils are well suited to forest production. The forestry practices described under capability unit IVe–6 apply to the Hugo soils.

CAPABILITY UNIT IIIe–3

This unit consists of shallow to moderately deep, sloping soils on old terraces or, in a few places, on shale uplands. The range of slope is from 5 to 10 percent. The texture of the surface soil ranges from loamy sand to clay loam. Permeability of the subsoil is moderate to very slow.

The surface soil is penetrated readily by roots and water, but the subsoil is a barrier at a depth of 10 to 36 inches. Water from rainfall or irrigation in excess of the water-holding capacity of the surface soil will cause temporary waterlogging and rapid runoff. Most of the soils tend to form a crust and become sealed after wetting. If they remain bare during the rainy season, severe erosion is likely to take place.

These soils are on rolling marine terraces near or along the ocean. The Watsonville loamy sand is adjacent to dune areas, and its surface soil consists partly of windblown sand.

The following soils are in this unit:

(CmC2) Colma sandy loam, sloping, eroded.
(ClC2) Colma loam, sloping, eroded.
(EhC2) Elkhorn sandy loam, sloping, eroded.
(LvC2) Lockwood loam, brown subsoil variant, sloping, eroded.
(PpC2) Pomponio loam, sloping, eroded.
(PoC2) Pomponio clay loam, sloping, eroded.
(TeC2) Tierra loam, sloping, eroded.
(TmC2) Tierra sandy loam, sloping, eroded.
(TcC2) Tierra clay loam, sloping, eroded.
(TsC2) Tierra sandy loam, acid variant, sloping, eroded.
(TuC2) Tunitas clay loam, sloping, eroded.
(TxC2) Tunitas loam, sloping, eroded.
(WmC2) Watsonville loam, sloping, eroded.
(WoC2) Watsonville clay loam, sloping, eroded.
(WsC2) Watsonville sandy loam, sloping, eroded.
(WoB) Watsonville loamy sand, gently sloping, overblown.

Use and management.—These soils have major problems in use because of the slope and the limited depth of soil suitable for roots. They are best suited to grain, hay crops, flax, and pasture, and also to shallow-rooted row crops. Winter-growing crops, such as grain and hay, make good use of the available moisture.

Major soil conservation practices are needed to prevent serious soil erosion and to maintain soil structure and fertility. The practices discussed in capability unit IIIe–1 also apply to these soils. These include rotation of cultivated crops with grasses and legumes, returning crop residues to the soil, including green-manure crops in the rotation, and cultivating across the slope. Crops respond to nitrogen fertilizer and, generally, to phosphate.

Irrigation must be controlled carefully to avoid saturating the soil above the claypan. Saturation may cause root rot, erosion, and leaching of plant nutrients. The soils are best suited to sprinkler irrigation, although furrow irrigation will give satisfactory results when alined on grades no greater than 0.5 percent. Water should be applied so as not to break down the structure and puddle the surface soil.

These sloping soils erode easily if they are allowed to remain bare over winter. Whenever the soil structure deteriorates, the soils erode more easily. The structure of the soil can be affected unfavorably by overworking the dry soil or by working it when too moist. The substratum materials of these soils tend to gully readily in swale areas and in water outlets. To prevent gullying, all outlets and channels should be protected. On long slopes diversion ditches are needed to intercept surface water and lead it to suitable outlets.

CAPABILITY UNIT IIIe–4

Except for slope, these soils are similar to those of capability unit IIs–4. Surface runoff is slightly more rapid and the erosion hazard slightly greater on the stronger slope.

The following soils are in this unit:

(BaC2) Baywood sandy loam, sloping, eroded.
(FcC2) Farallone coarse sandy loam, sloping, eroded.
(FyC2) Farallone loamy coarse sand, sloping, eroded.

Use and management.—These soils are used for and suited to the same crops as the soils of capability unit IIs–4. Soil management as to irrigation, fertilization, and other practices are also similar. Stronger slope, more rapid runoff, and a somewhat greater erosion hazard require more care to control erosion by use of the methods that are outlined under capability unit IIs–4.

CAPABILITY UNIT IIIs–3

These soils are shallow to moderately deep, and they have a slowly or very slowly permeable subsoil. Texture of the surface soil ranges from sandy loam to clay loam. The soils are on nearly level to gently sloping old terraces. The surface soil is readily penetrated by roots and water, but the subsoil is much less permeable. These soils are similar to those in capability unit IIIe–3, but they are more gently sloping.

Generally, the level of fertility of these soils is low. Because of the poor structure of the surface soil, they tend to seal and crust after wetting. Wet spots often remain because surface runoff is slow and internal drainage is very slow. These soils are located near the coast. The main areas are near Half Moon Bay and a few miles to the south. The Watsonville soils are the most extensive of the group.

The following soils are in this unit:

(EhB) Elkhorn sandy loam, gently sloping.
(EhB2) Elkhorn sandy loam, gently sloping, eroded.
(LvB2) Lockwood loam, brown subsoil variant, gently sloping, eroded.
(TeB) Tierra loam, gently sloping.
(TsB) Tierra sandy loam, acid variant, gently sloping.
(WoA) Watsonville clay loam, nearly level.
(WoB) Watsonville clay loam, gently sloping.
(WmA) Watsonville loam, nearly level.
(WmB) Watsonville loam, gently sloping.
(WmB2) Watsonville loam, gently sloping, eroded.
(WsB2) Watsonville sandy loam, gently sloping, eroded.
(WsB) Watsonville sandy loam, gently sloping.

Use and management.—These soils are best suited to shallow-rooted crops, such as irrigated pasture, hay, grain, and some row crops (fig. 13). Artichokes do not grow so well as on the deeper, more permeable soils. The practices for maintaining good soil structure and tilth, described under capability unit IIIe–3, apply to these soils. Subsoiling is sometimes needed to shatter the tillage pan, but the soils should not be subsoiled while wet. Likewise, they should not be grazed when wet, because they are easily trampled. Cover crops and green-manure

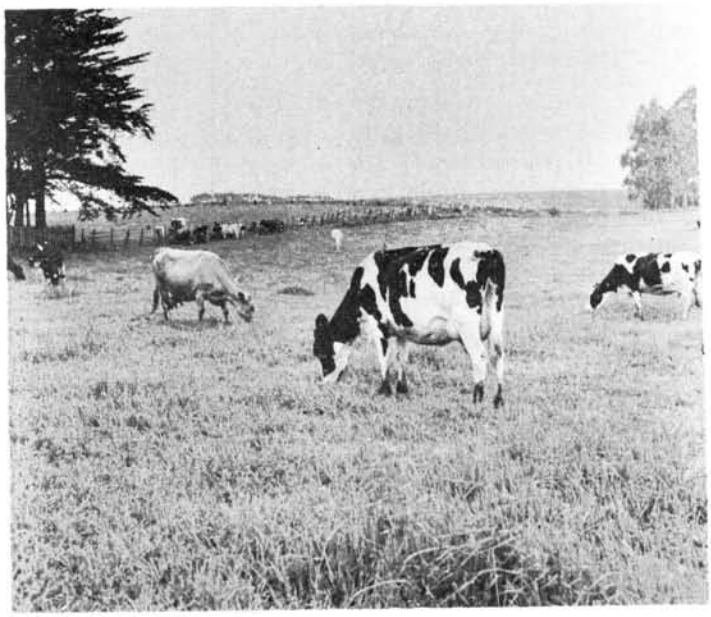


***Figure 13.*—Irrigated pasture on Watsonville loam, gently sloping.**

crops are needed to maintain organic matter. All crop residues should be returned to the soil. The soils respond well to nitrogen and phosphate.

Irrigation should be controlled carefully to prevent waterlogging above the dense subsoil. Sprinkler irrigation is best because the amount of water and its rate of application can be controlled best by this method. Border and furrow irrigation can also be used if careful management is practiced to prevent excess accumulation and ponding. With either of these two methods, a system for disposing of tail water is needed.

CAPABILITY UNIT IIIw–2

These soils are poorly drained because of their low position, slow internal drainage, or a combination of these. The texture of the surface soil is medium. The gently sloping soils are in small valleys and swales, and most of them are affected by excess seepage. These soils are similar to those in capability unit IIw–2 but are more poorly drained.

The following soils are in this unit:

(BfB)	Botella loam, nearly level and gently sloping, poorly drained variant.
(CoA)	Coquille loam, nearly level, saline.
(SpB)	Soquel loam, gently sloping, poorly drained.
(SrA)	Soquel loam, over clay, nearly level, poorly drained.
(WnA)	Watsonville loam, nearly level, poorly drained.
(WnB)	Watsonville loam, gently sloping, poorly drained.

Use and management.—These soils are best suited to irrigated pasture, hay crops, and grain. Some row crops and truck crops can be grown if drainage is improved. Planting dates are delayed because of wetness, and crops grown during the wet season may be damaged severely. Drainage can be improved by diverting runoff from higher areas, by constructing open ditches and tile or mole drains, and by avoiding overirrigation. The low position makes drainage difficult. Adequate outlets are necessary to dispose of the excess water.

Soil management practices described under capability unit IIw–2 apply to these soils. Late planting of crops is generally necessary because of wetness. The soils should not be grazed while they are wet. In places the Coquille soil contains excessive amounts of salt and needs soil amendments, such as gypsum, in addition to drainage.

CAPABILITY UNIT IVe–1

These soils are moderately steep and are underlain by rock or deep alluvium. The texture of the surface soil ranges from coarse sandy loam to silt loam. The soils are similar to those of capability unit IIIe–1, but they are steeper and more susceptible to erosion.

These soils occur throughout the uplands and along the numerous drainageways. The vegetation is mainly brush and grasses. There are a few conifers and hardwoods on the sheltered slopes.

The following soils are in the unit:

(FcD2)	Farallone coarse sandy loam, moderately steep, eroded.
(GbD2)	Gazos loam, moderately steep, eroded.
(GaD2)	Gazos fine sandy loam, moderately steep, eroded.
(GlD2)	Gazos-Lobitos silt loams, moderately steep, eroded.
(LaD2)	Laughlin loam, moderately steep, eroded.
(LbD2)	Laughlin-Sweeney loams, moderately steep, eroded.
(LlD2)	Lobitos loam, moderately steep, eroded.
(LdD2)	Lobitos loam, deep, moderately steep, eroded.
(LfD2)	Lobitos fine sandy loam, moderately steep, eroded.
(MmD2)	Miramar coarse sandy loam, moderately steep, eroded.
(SaD2)	Santa Lucia loam, moderately steep, eroded.

Use and management.—These soils are best maintained under a permanent cover of grass, but they are also suited to a rotation of hay, grain, and flax, if grass is grown 4 years out of 6. Crops will respond to nitrogen and phosphate. Because of the slope, major soil conservation practices are needed to prevent erosion. Long slopes need to have a system of stripcropping and diversion terraces. All tillage should be as nearly on the contour as feasible. All crop residues should be returned to the soil. Grain and flax residues, if allowed to remain on the soil surface as a mulch, will reduce erosion greatly.

Subsoiling on the contour when the soils are dry will increase water absorption and will aid in decreasing runoff. Water is available for irrigation of only a few areas. Irrigation by sprinkler system is best.

Large areas of these soils are used for grazing. The use and management of grazing land is similar to that discussed under capability unit VIe–1. Because of the elevation of some of these soils, grazing dates are likely to be somewhat delayed.

Measures for control of brush may be needed, especially if more intensive land use is planned.

CAPABILITY UNIT IVe–3

Soils of this unit are mostly moderately steep and are shallow to moderately deep. The texture of the surface soil ranges from sandy loam to clay loam. Permeability of the subsoil is dominantly moderate to very slow. The Baywood soil, which is very deep and has rapid to very rapid permeability, is included in this group because it has the same range of slope as the others and occupies only a small acreage. The parent material of these soils is softly consolidated rock.

Gullying is more severe on these soils than on the soils of capability unit IVe–1. Wet spots and seeps are present in some of the swales. The surface soil tends to crust and seal over after drying.

These soils are located on the steeper terraces near the ocean. They are similar to those in capability unit IIIe–3 but are steeper, more shallow, and more easily eroded. The vegetation is brush and grasses. Heavy brush covers the north-facing slopes and sheltered areas.

The following soils are in this unit:

(BaD2)	Baywood sandy loam, moderately steep, eroded.
(CmD2)	Colma sandy loam, moderately steep, eroded.
(ClD2)	Colma loam, moderately steep, eroded.
(EhD2)	Elkhorn sandy loam, moderately steep, eroded.
(LvD2)	Lockwood loam, brown subsoil variant, moderately steep, eroded.
(PpD2)	Pomponio loam, moderately steep, eroded.
(PoD2)	Pomponio clay loam, moderately steep, eroded.
(TeD2)	Tierra loam, moderately steep, eroded.
(TmD2)	Tierra sandy loam, moderately steep, eroded.
(TcD2)	Tierra clay loam, moderately steep, eroded.
(TsD2)	Tierra sandy loam, acid variant, moderately steep, eroded.
(TuD2)	Tunitas clay loam, moderately steep, eroded.
(WmD2)	Watsonville loam, moderately steep, eroded.
(WmC3)	Watsonville loam, sloping, severely eroded.
(WsD2)	Watsonville sandy loam, moderately steep, eroded.

Use and management.—These soils are best suited to grazing, although they can be cultivated for the production of grain, hay crops, or flax if they are carefully handled. When used for cultivated crops, they should be seeded to a grass and legume cover 4 out of 5 years. Good response is obtained from nitrogen and phosphate

fertilizers. All crop residues should be returned to the soil. Long slopes that collect large quantities of water ought to be divided by a system of stripcropping and diversion terraces. Cross-slope cultivation should be practiced. Waterways need to be protected by a cover of permanent vegetation to prevent gullies from forming. All residues of straw and stubble should be used as a protective mulch. Other soil management practices discussed under capability unit IIIe–3 apply to these soils.

A small acreage of these soils is irrigated. Sprinklers give the most uniform application of water. These soils become compacted easily and should not be grazed or cultivated when wet. Measures to control brush may be necessary where more intensive use is planned.

When these soils are used for grazing, perennial grasses produce the best quality feed and provide good protection for the soils. Suitable range management practices are discussed under capability unit VIe–1.

CAPABILITY UNIT IVe–5

These soils are moderately steep; they range from moderately deep to deep and have formed in place over basalt or shale. The texture of the surface soil ranges from loam to clay. These soils are inherently fertile and have good to very high water-holding capacity. They are located in the vicinity of Langley and Mindego Hills and overlie various parts of the Purisima formation. The cover is grass and scattered oaks on the soils over basalt rock, and brush and grass on the fine-textured soils over shale. Deep, sheltered canyons and north-facing slopes are covered by brush. Most areas are at higher elevations and are sometimes covered with snow for short periods in winter.

The following soils are in this unit:

(CcD2) Cayucos clay loam, moderately steep, eroded.
(CdD2) Cayucos clay loam, deep, moderately steep, eroded.
(CaD2) Cayucos clay, moderately steep, eroded.
(DuD2) Dublin clay, moderately steep, eroded.
(SwD2) Sweeney clay loam, moderately steep, eroded.
(SxD2) Sweeney clay loam, deep, moderately steep, eroded.
(SzD2) Sweeney stony clay loam, moderately steep, eroded.
(StD2) Sweeney clay, moderately steep, eroded.
(SyD2) Sweeney loam, moderately steep, eroded.

Use and management.—These soils are best suited to pasture, but grain, hay crops, or flax may be grown in places where the climate is satisfactory. The soils should be in permanent vegetation, however, for 3 out of 5 years.

If the soils are cultivated, the management practices discussed under capability unit IVe–1 apply to them. These include returning all crop residues to the soil, using stripcropping and diversion terraces on the longer slopes, growing a green-manure crop, and cultivating across the slope.

Some pastures are irrigated when water is available. A sprinkler system is recommended. These soils produce good yields of forage, and grazing will probably yield the largest net returns from them over long periods. Many of the soils are associated with steeper range soils and are used along with them for grazing. Suitable practices for range management are discussed under capability unit VIe–1. These soils are not well suited to timber production.

CAPABILITY UNIT IVe–6

These soils are moderately steep and are deep or moderately deep. They are coarse textured; the texture of the surface soil ranges from coarse sandy loam to loam. The parent materials were derived from a variety of rocks. The Butano soil was formed on white shale, locally called chalk rock. This soil occurs mainly in the vicinity of the Butano and Little Butano watersheds and in the mountains in the southern part of the Area. The Hugo soils were derived from sandstone and shale. They occur along the Skyline region and south of La Honda. The Sheridan soil was formed from granitic rocks and occurs only in a very limited area near Pilarcitos Lake. Rainfall in these areas is high, averaging from 35 to 45 inches annually. In their natural state the soils supported coniferous forests.

The following soils are in this unit:

(BuD) Butano loam, moderately steep.
(HyD2) Hugo and Josephine sandy loams, moderately steep, eroded.
(HzD) Hugo and Josephine sandy loams, very deep, moderately steep.
(HuD) Hugo and Josephine loams, moderately steep.
(HuD2) Hugo and Josephine loams, moderately steep, eroded.
(ShD) Sheridan coarse sandy loam, moderately steep.

Use and management.—These soils are best suited to trees and will produce good yields of timber. A few areas have been cleared and are cultivated or used for range. Yields of crops and forage are generally not high, but crops respond well to nitrogen and phosphate fertilizer. The erosion hazard is high if the soils are not protected by vegetation. If the soils are cultivated, the practices discussed under capability unit IVe–1 apply to them. If they are used for grazing, the range management practices discussed under capability unit VIe–1 apply.

When the soils are used to produce timber, disturbance of them in selective logging varies with the intensity of cutting. A light or moderate cut is best. The timber should not be logged during the wet season. Trees should be felled away from streams and should not be cut within 50 feet of the stream. "Cat" logging is feasible. Roads and trails ought to be located so that gradients are kept low and adequate drainage is provided. Outsloping of temporary roads is recommended.

For regenerative purposes, the minimum requirement for a source of seed for young timber stands is 80 seed trees for each 10 acres. This is required by the forest-practice rules for the Redwood District, which were approved by the California State Board of Forestry. Seed trees should be 18 inches or more in diameter at breast height.

Slash disposal should be by lopping and scattering, except where the fire hazard necessitates burning small concentrations of slash. Erosion is reduced by incorporating logging slash in skid trails. Slash should be kept out of the streams. Protection from forest fires is essential.

CAPABILITY UNIT VIe–1

These are steep, upland soils occurring mainly over sedimentary rocks. The depth ranges from shallow to moderately deep. The texture of the surface soil ranges from fine sandy loam to clay loam. Rocks and stones are present on the surface of many of the soils. Areas of fine-textured soils occur as inclusions in the Laughlin-Sweeney loams.

The soils of this unit are widely distributed throughout the Area, except in the strip near the coast. They are like the soils of capability unit IVe–1 but are steeper,

rockier, or shallower, and more susceptible to erosion. The vegetation consists of grasses and brush. Brush predominates on the north-facing slopes and in sheltered areas.

The following soils are in this unit:

(GbE2) Gazos loam, steep, eroded.
(GbD3) Gazos loam, moderately steep, severely eroded.
(GaE2) Gazos fine sandy loam, steep, eroded.
(GlE2) Gazos-Lobitos silt loams, steep, eroded.
(GsE2) Gazos and Lobitos stony loams, steep, eroded.
(GcE2) Gazos (dark phase)-Calera loams, steep, eroded.
(GkE2) Gazos (dark phase)-Sweeney loams, steep, eroded.
(LaE2) Laughlin loam, steep, eroded.
(LbE2) Laughlin-Sweeney loams, steep, eroded.
(LlE2) Lobitos loam, steep, eroded.
(LfE2) Lobitos fine sandy loam, steep, eroded.
(LyE2) Los Gatos clay loam, steep, eroded.
(SaE2) Santa Lucia loam, steep, eroded.
(SbE2) Santa Lucia stony loam, steep, eroded.

Use and management.—These soils are best suited to grazing. They should not be cultivated, except to prepare a seedbed to plant better forage grasses and legumes. They are occasionally used for growing hay, grain, and flax. When used for these crops, the practices recommended for capability unit IVe–1 should be applied.

Proper grazing is needed to obtain good yields of forage on these soils and to control erosion. Rotation grazing and proper stocking are the most important practices. If the range has been grazed properly, the vegetation has a patchy appearance toward the end of the grazing season. It is well to allow plants to get a good early growth of not less than 4 inches before any grazing is permitted. Watering places should be readily available to livestock. This often requires development of springs and wells and construction of dams.

Reseeding of ranges is often desirable where forage has been depleted by overgrazing or cultivation. Harding grass, subterranean clover, annual ryegrass, alfalfa, and birdsfoot trefoil have been proved satisfactory for reseeding. Reseeding will often lengthen the period during which green feed is available.

Fertilizer, applied in adequate amounts before the first rain, will increase early yields of forage. Fertilizer also stimulates denser growth that gives protection against heavy rains. Tests indicate that nitrogen and phosphate fertilizer is needed the most.

Fences should be located according to the condition of the range. Properly located cross fences are essential for good distribution of livestock and forage use. At the end of the grazing season, enough vegetation should be left to protect the soils from early rains. Proper stocking is essential for good range management.

The following is a guide for determining the condition of range on these soils:

Excellent condition: 65 percent or more of the cover is made up of desirable, vigorous forage plants. There are no undesirable forage plants, such as coyotebrush, plantain, and wild blackberry. Litter from plants is adequate for the control of erosion and forage improvement. The range is producing at its best under natural conditions.

Good condition: 40 to 65 percent of the vegetation is made up of the better range plants. Under good management a range in good condition can be improved to produce about 50 percent to 100 percent more usable forage.

Fair condition: 25 to 40 percent of the vegetation is made up of the better range plants. Poor forage plants, such as annual fescue, wild barley, coyotebrush, weeds, and other undesirable vegetation, have invaded or are increasing. A range in fair condition can be improved to produce two to four times as much forage.

Poor condition: Most of the vegetation consists of poor grasses, such as annual fescue and wild barley, along with wild blackberry, plantain, other weeds, and coyotebrush. Coyotebrush invades the coastal areas very rapidly. Less than 15 percent of the good forage plants remain in the stand. The stand of vegetation may be light. There is little mulch; erosion is active and may be severe. This range can be improved to produce four or more times as much forage.

The soils of capability unit VIe–1 are not well suited to forestry, although a few native firs and redwoods grow in swales and on north-facing slopes.

CAPABILITY UNIT VIe–3

These are steep, eroded, very shallow to moderately deep soils on marine terraces. The surface soil is sandy loam or loam.

The underlying material is only slightly consolidated and, if not protected, the soils will gully readily. All the soils tend to crust and seal after drying, and movement of water into them is slow.

These soils occur on marine terraces along the coast from Montara to the southern tip of the county. The cover is grasses and brush. Brush is especially thick on the north-facing slopes, and it reappears rapidly after clearing. Coyotebrush is the chief invading plant. These soils are similar to those in capability unit IVe–3 but are steeper, shallower, and more susceptible to erosion.

The following soils are in the unit:

(ClE2) Colma loam, steep, eroded.
(CmE2) Colma sandy loam, steep, eroded.
(EhE3) Elkhorn sandy loam, moderately steep and steep, severely eroded.
(PpE2) Pomponio loam, steep, eroded.
(TeE2) Tierra loam, steep, eroded.
(TeD3) Tierra loam, moderately steep, severely eroded.
(TsE3) Tierra sandy loam, acid variant, steep, severely eroded.
(WmE3) Watsonville loam, moderately steep and steep, severely eroded.

Use and management.—These soils are well suited to grazing if properly managed. Some of them are cultivated occasionally for grain, hay, and flax, although they are poorly suited to these uses because of the high erosion hazard.

The soils are more susceptible to gully erosion than those of capability unit VIe–1, and they require more intensive management for control of erosion. Adequate plant residues are essential to protect the soils during the rainy season.

The range management practices and the range condition guide described under capability unit VIe–1 apply to these soils. Coyotebrush, wild blackberry, and other undesirable plants rapidly invade these soils, even during periods of nonuse. Eradication of brush is a continuing problem, and the presence of these invaders does not necessarily indicate overgrazing.

CAPABILITY UNIT VIe–4

The one soil in this unit is steep. It is moderately coarse textured and is moderately deep to deep over deeply weathered granite. It is located north and east of Half Moon Bay.

The surface soil is coarse sandy loam, and the subsoil contains some clay, especially in areas at the lower elevations. At higher elevations, the profile is less strongly developed. In its native condition, this soil is covered heavily with brush and must be cleared if more intensive use is planned.

Because of its moderately coarse texture, the soil has low moisture-holding capacity and is very susceptible to sheet erosion. The fertility level is fair or low, and yields of forage are only moderate after this soil is cleared. This soil is similar to the soils in capability unit IVe–1 but is steeper, shallower, and somewhat more eroded. The soil is:

(MmE2) Miramar coarse sandy loam, steep, eroded.

Use and management.—After this soil has been cleared, it should be used for grazing. It is sometimes cultivated to grain and hay but is poorly suited to these uses because of the erosion hazard.

The soil is moderately good for range, but certain undesirable plants, such as coyotebrush and wild blackberry, invade rapidly, even during periods of nonuse. The presence of these invaders does not necessarily indicate overgrazing. Adequate plant residues should be left after the grazing period has ended to protect against sheet erosion. The soil is not suitable for timber production.

The range management practices and the range condition guide discussed under capability unit VIe–1 apply also to this soil.

CAPABILITY UNIT VIe–5

These are steep, shallow to deep soils underlain by basalt or shale. The Sweeney soils were formed from basalt rock, and the texture of their surface soil ranges from medium to moderately fine. The Cayucos soil was derived from shale, and the texture of the surface layer is moderately fine.

These soils have a stable structure, and they do not erode so readily as the soils of capability unit VIe–1 and VIe–3. Stones are numerous in the soils formed from basalt rock. All soils of the unit are normally very fertile and have good water-holding capacity. Yields of forage are high. The soils are located in the vicinity of Mindego and Langley Hills and in other upland areas. At the high elevations, snow occasionally falls during winter. These soils are similar to those in capability unit IVe–5 but are steeper, shallower, and somewhat more rocky.

The soils derived from basalt consist of open grassland, but the vegetation includes some oaks, madrone, and brush. Grasses and brush predominate on the south-facing slopes and ridgetops of the Cayucos soil derived from shale. The north-facing slopes and sheltered areas are mainly covered by brush.

The following soils are in this unit:

(CcE2) Cayucos clay loam, steep, eroded.
(SwE2) Sweeney clay loam, steep, eroded.
(SzE2) Sweeney stony clay loam, steep, eroded.
(SyE2) Sweeney loam, steep, eroded.

Use and management.—These soils are high producers of forage. Normally, brush does not invade so rapidly as on the other range soils. At high elevations, the grazing season is somewhat delayed because of the severe climate in winter and spring. The soils, where not overly rocky, are well suited to the establishment of improved range plants. The range management practices and the range condition guide discussed under capability unit VIe–1 apply to these soils.

Grain, hay, and flax are grown occasionally, but, because of steep slopes and the hazard of erosion, the soils are not suited to these crops. The soils are not well suited to timber production.

CAPABILITY UNIT VIe–6

These soils are steep, erodible, and moderately deep to deep. They generally overlie sandstone or shale. The texture of the surface soil ranges from coarse sandy loam to clay loam.

The vegetation consists mainly of Douglas-fir and redwood but includes scattered hardwoods, such as madrone, oak, and tanbark oak. Some brush grows as an understory. The origin of most of the soils and their location are the same as described for the soils of capability unit IVe–6. Rainfall ranges from 35 to 45 inches annually. These soils are similar to those in capability unit IVe–6, but are steeper and more susceptible to erosion.

The following soils are in this unit:

(BuE) Butano loam, steep.
(HyE) Hugo and Josephine sandy loams, steep.
(HyE2) Hugo and Josephine sandy loams, steep, eroded.
(HuE) Hugo and Josephine loams, steep.
(HuE2) Hugo and Josephine loams, steep, eroded.
(MdE) Mindego clay loam, steep.
(ShE) Sheridan coarse sandy loam, steep.

Use and management.—These soils are best suited to forestry. The woodland management practices described under capability unit IVe–6 apply to these soils, but more careful management is needed because of the steeper slopes and higher erosion hazard. Mulching and seeding are recommended on raw slopes that result from logging or road construction. If a high-lead logging system is used, yarding should be uphill. Light selective cutting is advisable to reduce soil disturbance.

When cleared, these soils produce fair amounts of usable forage. Brush and trees tend to restock cleared areas rather rapidly, and they reduce yields of forage. The range management practices and the range condition classes discussed under capability unit VIe–1 apply to these soils. Most of these soils are at high elevations, and the growing season is short.

CAPABILITY UNIT VIIe–1

These are very steep, moderately coarse or medium-textured soils over sandstone, shale, basalt, or serpentine rocks. The depth of soil ranges from shallow to moderately deep. The vegetation consists of grass, brush, and a few hardwood trees.

The shallow soils are low in fertility and in water-holding capacity. Rock outcrops are present in many places. Most of the north-facing slopes and sheltered areas are covered with thick brush. These soils are extensive throughout the Area, except along the coast. These soils are similar to those of capability unit VIe–1 but are steeper and rockier. They are also shallower and are generally more eroded.

The following soils are in this unit:

(GbF2) Gazos loam, very steep, eroded.
(GlF) Gazos-Lobitos silt loams, very steep.
(GsF2) Gazos and Lobitos stony loams, very steep, eroded.
(GoF3) Gazos and Lobitos soils, steep and very steep, severely eroded.
(GcF2) Gazos (dark phase)-Calera loams, very steep, eroded.
(LaF2) Laughlin loam, very steep, eroded.
(LbF2) Laughlin-Sweeney loams, very steep, eroded.
(LlF2) Lobitos loam, very steep, eroded.
(LzF) Los Gatos loam, very steep.
(MoF2) Montara stony loam, steep and very steep, eroded.
(SaF2) Santa Lucia loam, very steep, eroded.
(SaF3) Santa Lucia loam, steep and very steep, severely eroded.
(SbF2) Santa Lucia stony loam, very steep, eroded.
(SbF3) Santa Lucia stony loam, steep and very steep, severely eroded.
(ScF3) Santa Lucia stony loam, very shallow, steep and very steep, severely eroded.

Use and management.—These soils are fair for grazing, but yields of forage are likely to be low because of the dense cover of brush, low fertility, and low water-holding capacity. Brush generally reappears rapidly after clearing. Local areas of deeper soils and some south-facing slopes have clearings that produce good forage. Ample forage residues should be left to protect the soils from erosion during the rainy season. The range management practices listed under capability unit VIe–1, except those pertaining to reseeding and fertilizing, apply to the soils of this unit. Very steep slopes generally prohibit the use of most of the equipment that is used in reseeding and fertilizing ranges.

The following guide is suggested for estimating the condition of the range on these soils:

Excellent condition: Most of the cover consists of desirable, vigorous forage plants. There are no undesirable forage plants, such as coyotebrush. Litter from plants is adequate for controlling erosion and improving forage. This range is producing at about its best.

Good condition: More than half the cover consists of desirable forage plants. There are only a few undesirable plants, such as coyotebrush. Litter from plants is adequate for controlling erosion and improving forage. This range can be improved to produce 50 to 100 percent more forage.

Fair condition: Less than half of the cover consists of desirable forage plants. Undesirable plants, such as coyotebrush, make up more than half the cover. Litter from plants is likely to be inadequate for controlling erosion. This range can be improved to produce two to four times more forage.

Poor condition: Coyotebrush and other undesirable plants make up most of the cover. There are very few vigorous, desirable forage plants. Litter from plants is likely to be inadequate to control erosion and protect young forage. This range can be improved to produce four times or more forage.

Coyotebrush, wild blackberry, and other woody plants invade these soils regardless of intensity of use. Eradication of brush from time to time is necessary to keep these invaders to a minimum.

CAPABILITY UNIT VIIe–3

This unit consists of very steep, shallow or moderately deep soils on loosely consolidated marine terraces along or near the coast. The texture of the surface soil ranges from sandy loam to loam. The subsoil is finer textured than the surface soil.

These soils are highly susceptible to sheet and gully erosion. They seal easily upon wetting and absorb water slowly when they are not protected by vegetation. Erosion can be very severe during the rainy months. The cover is grasses and brush; brush is more dense on the north-facing slopes and in sheltered ravines. These soils are similar to those in capability unit VIe–3 but are steeper and shallower and some of them have been more severely eroded.

The following soils are in this unit:

(CmF2) Colma sandy loam, very steep, eroded.
(CmF3) Colma sandy loam, steep and very steep, severely eroded.
(ClF2) Colma loam, very steep, eroded.
(TeE3) Tierra loam, steep, severely eroded.

Use and management.—These soils are fair for grazing. Yields of forage are sometimes low because of dense stands of brush, which normally invades rapidly. The presence of brush does not necessarily indicate overgrazing. These soils are not suitable for the production of timber. When they are cleared for grazing, they should be managed carefully because of the severe hazard of erosion. Livestock should be kept off soils that have been wet for extended periods.

Some areas of these soils are used for intensive cultivation, but they are very poorly suited to this use. They may be disturbed occasionally to establish better range vegetation. Ample residue of forage should be left after the grazing season to prevent erosion when the rains come.

The range management practices discussed under capability unit VIe–1, with the exception of extensive reseeding and fertilizing, and the range condition guide suggested under capability unit VIIe–1 apply to the soils of this unit.

CAPABILITY UNIT VIIe–4

These are steep or very steep, moderately coarse textured, shallow to moderately deep soils underlain by weathered granite. The texture of the surface soil is coarse sandy loam.

The soils are covered mainly by brush. They erode very readily if not covered by some type of vegetation. The soils are located north and east of Half Moon Bay. They are similar to the soil in capability unit VIe–4 but are steeper, shallower, rockier, and generally more eroded.

The following soils are in this unit:

(MmE3) Miramar coarse sandy loam, steep, severely eroded.
(MmF2) Miramar coarse sandy loam, very steep, eroded.

Use and management.—These soils are fair or poor rangeland. Some areas have been cleared for farming but are not suited to that use. When they are cleared for grazing, production of forage is moderate to low. Brush returns rapidly after the soils have been cleared and is not necessarily an indication of overgrazing. If the soils are not used for grazing, the dense brush serves very well for watershed protection.

The practices for range management that are discussed under capability unit VIe–1 apply to these soils, except those of seeding and fertilizing. To determine range condition, the guide given under capability unit VIIe–1 can be applied.

The soils are not suited to timber production.

CAPABILITY UNIT VIIe–5

The soils of this unit are very steep; their depth ranges from shallow to deep; and they are underlain by basalt or shale. The texture of the surface soil ranges from loam to clay loam.

Rock outcrops and stones are numerous. The soils are inherently very fertile and produce considerable forage. They have high water-holding capacity and stable structure. The soils do not erode so readily as the other range soils in class VII.

A large area of these soils is in the vicinity of Mindego and Langley Hills. The vegetation consists of grasses and scattered oaks, and some fairly dense stands of brush and hardwoods are on the north-facing slopes and in sheltered areas. Most areas of open grassland are on the soils derived from basalt.

The soils in this unit are similar to those in capability unit VIe–5, but they are steeper, shallower, and more rocky. The soils are:

(CcF2) Cayucos clay loam, very steep, eroded.
(CcF3) Cayucos clay loam, steep and very steep, severely eroded.
(CeF2) Cayucos stony clay loam, very steep, eroded.
(SwF2) Sweeney clay loam, very steep, eroded.
(SwF3) Sweeney clay loam, steep and very steep, severely eroded.
(SzF2) Sweeney stony clay loam, very steep, eroded.
(SyF2) Sweeney loam, very steep, eroded.

Use and management.—These soils are fairly good for range. They should be maintained in permanent cover. Brush may invade, but not so rapidly as on the other soils of class VII. The encroachment of brush is not necessarily an indication of overgrazing. When the soils are used and managed as range, moderately high yields of forage can be expected. At high elevations, the more severe climate in winter and spring may delay grazing.

The practices for range management that are discussed under capability unit VIe–1 apply to these soils, with the exception of seedbed preparation and fertilizing. To determine range condition, the guide shown under capability unit VIIe–1 is suitable.

These soils are not suited to timber production.

CAPABILITY UNIT VIIe–6

This is mainly forest land. Some of the soils have been cleared and used to a limited extent for grazing. The soils are very steep and are moderately deep to very deep. They are underlain by various kinds of rock, mainly shale or sandstone. The nature and occurrence of similar, but moderately steep, soils are described under capability unit IVe–6. Rainfall is high, averaging 35 to 50 inches annually. The vegetation consists of Douglas-fir, redwood, and some hardwoods, such as madrone, oak, and tanbark oak. Roots of the trees often penetrate into the upper mantle of decomposed rock. These soils are similar to the soils of capability unit VIe–6 but are steeper, shallower, and more subject to erosion when the forest cover is disturbed. They are extensive throughout the Area. The soils are mainly in forest, but some have been cleared and are used for grazing.

The following soils are in this unit:

(BuF) Butano loam, very steep.
(BsF) Butano shaly loam, very steep.
(HyF2) Hugo and Josephine sandy loams, very steep, eroded.
(HuF) Hugo and Josephine loams, very steep.
(HyF) Hugo and Josephine sandy loams, very steep.
(MdF) Mindego clay loam, very steep.
(MgF) Mindego stony clay loam, very steep.
(ShF) Sheridan coarse sandy loam, very steep.

Use and management.—When the soils are used for forestry, the forestry practices discussed under capability unit IVe–6 apply to them. The practices should be applied more intensively to these soils because of the very steep slopes. Roads, so far as practicable, should be located along the ridgetops and on benches. If the soils are not well protected by vegetation, high-lead logging is recommended because of the serious erosion hazard.

The best possible protection from fire should be provided. After the soils have been cleared and before they are invaded by brush and trees, they will produce moderate or low amounts of forage.

CAPABILITY UNIT VIIIe–1

The land types in this group are Coastal beaches, Terrace escarpments, Mixed alluvial land, Rough broken land, Active dune land, and severely eroded land. These miscellaneous land types are extensive throughout the Area. Large areas of Rough broken land include some areas suitable for grazing or forestry, but they are generally too small to use separately.

The following land types are in the unit:

(Ad) Active dune land.
(Cf) Coastal beaches.
(Gu) Gullied land (alluvial soil material).
(Gv) Gullied land (Gazos-Lobitos soil material).
(Gw) Gullied land (Tierra and Watsonville soil materials).
(Ma) Mixed alluvial land.
(Rb) Rough broken land.
(Sd) Stabilized dune land.
(Ta) Terrace escarpments.

Use and management.—These land types do not produce any significant amount of forage or timber. Various practices are needed for their protection. Rough broken land needs mainly a good system of fire protection, because of the value of vegetation on the watersheds. Fire trails and water supplies should be provided.

On dunes and beaches, wind-erosion controls, such as dune fences and the planting of special vegetation, may be necessary to keep the sand from blowing and covering valuable cropland. Severely eroded land should be protected so the gullies will not spread and enlarge. Some measures that might be needed are fencing, planting suitable vegetation, diverting runoff water, or filling and seeding the gullied areas. Terrace escarpments may need fencing so they will not be trampled and grazed by livestock.

Storie Index Rating

The soils of the Area are arranged in alphabetic order in table 5 and are rated according to the Storie index (*5*, *18*). This index expresses numerically the relative degree of suitability or value of a soil for general intensive

agriculture. The rating is based on soil characteristics only and is obtained by evaluating such factors as depth, texture of the surface soil and density of subsoil, drainage, alkali content, and relief. Other factors, such as availability of water for irrigation, climate, and distance from markets, that might determine the desirability of growing certain plants in a given locality, are not considered. Therefore, in itself the index cannot be considered as an index of land evaluation.

Four general factors are considered in the index rating. These factors are (A) the characteristics of the soil profile and soil depth; (B) the texture of the surface soil; (C) slope; and (X) other factors, such as drainage, alkali, and erosion. Each of these four general factors is evaluated on the basis of 100 percent. A rating of 100 percent expresses the most favorable, or ideal, condition, and lower percentage ratings are given for conditions that are less favorable for crop production.

TABLE 5.—*Storie index rating for soils of the San Mateo Area, Calif.*

Map symbol	Soil	Soil rating factors				Index rating
		A (profile)	B (texture)	C (slope)	X (other conditions)	
						Percent
Ad	Active dune land					[1] 5
BaB2	Baywood sandy loam, gently sloping, eroded	100	95	95	85	77
BaC2	Baywood sandy loam, sloping, eroded	100	95	85	85	69
BaD2	Baywood sandy loam, moderately steep, eroded	100	95	75	85	67
BcA	Botella clay loam, nearly level	95	85	100	100	81
BcB	Botella clay loam, gently sloping	95	85	95	100	77
BcC2	Botella clay loam, sloping, eroded	95	95	85	90	69
BeB	Botella loam, gently sloping	95	100	95	100	90
BeC2	Botella loam, sloping, eroded	95	100	85	90	72
BdA	Botella loam, nearly level, imperfectly drained	95	100	100	90	85
BdB	Botella loam, gently sloping, imperfectly drained	95	100	95	90	81
BoC	Botella loam, sloping, seeped	95	100	85	90	72
BfB	Botella loam, nearly level and gently sloping, poorly drained variant	95	100	97	35	32
BuE	Butano loam, steep	80	100	40	90	29
BuD	Butano loam, moderately steep	80	100	75	90	54
BuF	Butano loam, very steep	80	100	20	90	14
BsF	Butano shaly loam, very steep	80	90	20	90	13
CcE2	Cayucos clay loam, steep, eroded	60	85	40	90	18
CcC2	Cayucos clay loam, sloping, eroded	60	85	85	90	39
CcD2	Cayucos clay loam, moderately steep, eroded	60	85	75	90	34
CcF2	Cayucos clay loam very steep, eroded	60	85	20	90	9
CcF3	Cayucos clay loam, steep and very steep, severely eroded	60	85	30	60	9
CdC2	Cayucos clay loam, deep, sloping, eroded	70	85	85	90	45
CdD2	Cayucos clay loam, deep, moderately steep, eroded	70	85	75	90	40
CaD2	Cayucos clay, moderately steep, eroded	60	60	75	90	24
CeF2	Cayucos stony clay loam, very steep, eroded	60	60	20	90	24
Cf	Coastal beaches					[1] 5
CmF2	Colma sandy loam, very steep, eroded	70	95	20	90	12
CmC2	Colma sandy loam, sloping, eroded	70	95	85	90	51
CmD2	Colma sandy loam, moderately steep, eroded	70	95	75	90	45
CmE2	Colma sandy loam, steep, eroded	70	95	40	90	24
CmF3	Colma sandy loam, steep and very steep, severely eroded	70	95	30	60	12
ClC2	Colma loam, sloping, eroded	70	100	85	90	53
ClD2	Colma loam, moderately steep, eroded	70	100	75	90	47
ClE2	Colma loam, steep, eroded	70	100	40	90	23
ClF2	Colma loam, very steep, eroded	70	100	20	90	13
CoA	Coquille loam, nearly level, saline	100	100	100	12	12
CsA	Corralitos sandy loam, nearly level	100	95	100	100	95
CsB	Corralitos sandy loam, gently sloping	100	95	95	100	91
CwB	Corralitos sandy loam, over gravel, gently sloping	80	95	95	100	72
CtA	Corralitos sandy loam, nearly level, imperfectly drained	100	95	100	90	86
CtB	Corralitos sandy loam, gently sloping, imperfectly drained	100	95	95	90	82
CuA	Corralitos sandy loam, over gravel, nearly level, imperfectly drained	80	95	100	90	68
CyA	Corralitos sandy loam, over clay, nearly level, imperfectly drained	95	95	95	90	77
CrA	Corralitos loamy sand, nearly level, imperfectly drained	100	80	100	90	72
DcA	Denison clay loam, nearly level	85	85	100	100	72
DdA	Denison clay loam, nearly level, imperfectly drained	85	85	100	90	65
DmA	Denison loam, nearly level	85	100	100	100	85
DmB	Denison loam, gently sloping	85	100	95	100	81
DmC	Denison loam, sloping	85	100	85	100	72
DeA	Denison coarse sandy loam, nearly level	85	90	100	100	76
DuA	Dublin clay, nearly level	95	60	100	90	57

See footnotes at end of table.

TABLE 5.—*Storie index rating for soils of the San Mateo Area, Calif.*—Continued

Map symbol	Soil	Soil rating factors				Index rating
		A (profile)	B (texture)	C (slope)	X (other conditions)	
						Percent
DuB	Dublin clay, gently sloping	95	60	95	100	54
DuC2	Dublin clay, sloping, eroded	95	60	85	90	44
DuD2	Dublin clay, moderately steep, eroded	95	60	75	90	38
DwA	Dublin clay, nearly level, imperfectly drained	95	60	100	90	52
DwB	Dublin clay, gently sloping, imperfectly drained	95	60	95	90	49
EhC2	Elkhorn sandy loam, sloping, eroded	85	95	85	85	58
EhB	Elkhorn sandy loam, gently sloping	85	95	95	95	73
EhB2	Elkhorn sandy loam, gently sloping, eroded	85	95	95	85	65
EhD2	Elkhorn sandy loam, moderately steep, eroded	85	95	75	85	51
EhE3	Elkhorn sandy loam, moderately steep and steep, severely eroded	85	95	60	55	27
EtB	Elkhorn sandy loam, thick surface, gently sloping	90	95	95	95	77
EtC2	Elkhorn sandy loam, thick surface, sloping, eroded	90	95	85	85	62
FcA	Farallone coarse sandy loam, nearly level	100	90	100	100	90
FcB	Farallone coarse sandy loam, gently sloping	100	90	95	100	86
FcC2	Farallone coarse sandy loam, sloping, eroded	100	90	85	90	69
FcD2	Farallone coarse sandy loam, moderately steep, eroded	100	90	75	90	61
FsB	Farallone coarse sandy loam, over coarse sands, gently sloping, seeped	90	90	95	90	69
FaA	Farallone loam, nearly level	100	100	100	100	100
FaB	Farallone loam, gently sloping	100	100	95	100	95
FyB	Farallone loamy coarse sand, gently sloping	100	70	95	100	66
FyC2	Farallone loamy coarse sand, sloping, eroded	100	70	85	90	54
GbF2	Gazos loam, very steep, eroded	40	100	20	90	7
GbC2	Gazos loam, sloping, eroded	40	100	85	90	31
GbD2	Gazos loam, moderately steep, eroded	40	100	75	90	27
GbE2	Gazos loam, steep, eroded	40	100	40	90	14
GbD3	Gazos loam, moderately steep, severely eroded	40	100	75	60	18
GdC2	Gazos loam, dark, sloping, eroded	40	100	85	90	31
GaD2	Gazos fine sandy loam, moderately steep, eroded	40	100	75	90	27
GaE2	Gazos fine sandy loam, steep, eroded	40	100	40	90	14
GlB	Gazos-Lobitos silt loams, gently sloping	50	100	95	100	48
GlC2	Gazos-Lobitos silt loams, sloping, eroded	50	100	85	90	38
GlD2	Gazos-Lobitos silt loams, moderately steep, eroded	50	100	75	90	34
GlF	Gazos-Lobitos silt loams, very steep	50	100	20	100	10
GlE2	Gazos-Lobitos silt loams, steep, eroded	50	100	40	90	18
GsE2	Gazos and Lobitos stony loams, steep, eroded	40	80	40	90	11
GsF2	Gazos and Lobitos stony loams, very steep, eroded	40	80	20	90	6
GoF3	Gazos and Lobitos soils, steep and very steep, severely eroded	40	80	30	60	6
GcC2	Gazos (dark phase)-Calera loams, sloping, eroded	40	100	85	90	31
GcE2	Gazos (dark phase)-Calera loams, steep, eroded	40	100	40	90	14
GcF2	Gazos (dark phase)-Calera loams, very steep, eroded	40	100	20	90	7
GkE2	Gazos (dark phase)-Sweeney loams, steep, eroded	40	100	40	90	14
Gu	Gullied land (alluvial soil material)					[1] 15
Gv	Gullied land (Gazos-Lobitos soil material)					[1] 9
Gw	Gullied land (Tierra and Watsonville soil materials)					[1] 5
HyF	Hugo and Josephine sandy loams, very steep	80	95	20	90	14
HyF2	Hugo and Josephine sandy loams, very steep, eroded	80	95	20	85	13
HyE2	Hugo and Josephine sandy loams, steep, eroded	80	95	40	85	26
HyE	Hugo and Josephine sandy loams, steep	80	95	40	90	27
HyD2	Hugo and Josephine sandy loams, moderately steep, eroded	80	95	75	85	48
HyC2	Hugo and Josephine sandy loams, sloping, eroded	80	95	85	85	55
HzC	Hugo and Josephine sandy loams, very deep, sloping	90	95	85	90	65
HzD	Hugo and Josephine sandy loams, very deep, moderately steep	90	95	75	90	55
HuC	Hugo and Josephine loams, sloping	80	100	85	90	61
HuD	Hugo and Josephine loams, moderately steep	80	100	75	90	54
HuD2	Hugo and Josephine loams, moderately steep, eroded	80	100	75	85	51
HuE	Hugo and Josephine loams, steep	80	100	40	90	29
HuE2	Hugo and Josephine loams, steep, eroded	80	100	40	85	27
HuF	Hugo and Josephine loams, very steep	80	100	20	90	14
HvB	Hugo and Josephine loams, very deep, gently sloping	90	100	95	90	77
HvC	Hugo and Josephine loams, very deep, sloping	90	100	85	90	69
LaE2	Laughlin loam, steep, eroded	50	100	40	90	18
LaF2	Laughlin loam, very steep, eroded	50	100	20	90	9
LaD2	Laughlin loam, moderately steep, eroded	60	100	75	90	40
LaC2	Laughlin loam, sloping, eroded	60	100	85	90	46
LbC2	Laughlin-Sweeney loams, sloping, eroded	60	100	85	90	46
LbD2	Laughlin-Sweeney loams, moderately steep, eroded	60	100	75	90	40

See footnotes at end of table.

TABLE 5.—*Storie index rating for soils of the San Mateo Area, Calif.*—Continued

Map symbol	Soil	Soil rating factors				Index rating
		A (profile)	B (texture)	C (slope)	X (other conditions)	
						Percent
LbE2	Laughlin-Sweeney loams, steep, eroded	60	100	40	90	22
LbF2	Laughlin-Sweeney loams, very steep, eroded	60	100	20	90	11
LlE2	Lobitos loam, steep, eroded	60	100	40	90	22
LlF2	Lobitos loam, very steep, eroded	60	100	20	90	11
LlD2	Lobitos loam, moderately steep, eroded	60	100	75	90	41
LlC2	Lobitos loam, sloping, eroded	60	100	85	90	46
LdD2	Lobitos loam, deep, moderately steep, eroded	70	100	75	90	47
LdC2	Lobitos loam, deep, sloping, eroded	70	100	85	90	54
LfC2	Lobitos fine sandy loam, sloping, eroded	60	100	85	90	46
LfD2	Lobitos fine sandy loam, moderately steep, eroded	60	100	75	90	40
LfE2	Lobitos fine sandy loam, steep, eroded	60	100	40	90	22
LmB	Lockwood loam, gently sloping	90	100	95	100	85
LmC2	Lockwood loam, sloping, eroded	90	100	85	90	70
LwB	Lockwood loam, gently sloping, seeped	90	100	95	90	77
LwC	Lockwood loam, sloping, seeped	90	100	85	90	70
LoA	Lockwood loam, nearly level, imperfectly drained	90	100	100	90	81
LsB	Lockwood shaly loam, gently sloping	90	90	95	100	77
LvB2	Lockwood loam, brown subsoil variant, gently sloping, eroded	75	100	95	90	64
LvC2	Lockwood loam, brown subsoil variant, sloping, eroded	75	100	85	90	57
LvD2	Lockwood loam, brown subsoil variant, moderately steep, eroded	75	100	75	90	50
LzF	Los Gatos loam, very steep	60	100	20	100	12
LyC2	Los Gatos clay loam, sloping, eroded	60	85	85	90	39
LyE2	Los Gatos clay loam, steep, eroded	60	85	40	90	18
MdF	Mindego clay loam, very steep	80	85	20	100	14
MdE	Mindego clay loam, steep	80	85	40	100	27
MgF	Mindego stony clay loam, very steep	80	70	20	100	11
MmE2	Miramar coarse sandy loam, steep, eroded	40	90	40	90	13
MmC2	Miramar coarse sandy loam, sloping, eroded	40	90	85	90	28
MmD2	Miramar coarse sandy loam, moderately steep, eroded	40	90	75	90	24
MmE3	Miramar coarse sandy loam, steep, severely eroded	40	90	40	60	9
MmF2	Miramar coarse sandy loam, very steep, eroded	40	90	20	90	6
Ma	Mixed alluvial land					[1] 5
MoF2	Montara stony loam, steep and very steep, eroded	30	80	30	90	6
PpD2	Pomponio loam, moderately steep, eroded	60	100	75	90	40
PpC2	Pomponio loam, sloping, eroded	60	100	85	90	46
PpE2	Pomponio loam, steep, eroded	60	100	40	90	22
PoC2	Pomponio clay loam, sloping, eroded	60	85	85	90	39
PoD2	Pomponio clay loam, moderately steep, eroded	60	85	75	90	34
Rb	Rough broken land					[1] .5
SaF2	Santa Lucia loam, very steep, eroded	60	100	20	90	11
SaC2	Santa Lucia loam, sloping, eroded	60	100	85	90	46
SaD2	Santa Lucia loam, moderately steep, eroded	60	100	75	90	41
SaE2	Santa Lucia loam, steep, eroded	60	100	40	90	22
SaF3	Santa Lucia loam, steep and very steep, severely eroded	60	100	30	60	11
SbE2	Santa Lucia stony loam, steep, eroded	60	80	40	90	17
SbF2	Santa Lucia stony loam, very steep, eroded	60	80	20	90	9
SbF3	Santa Lucia stony loam, steep and very steep, severely eroded	60	80	30	60	9
ScF3	Santa Lucia stony loam, very shallow, steep and very steep, severely eroded	30	80	30	60	4
ShF	Sheridan coarse sandy loam, very steep	80	90	20	90	13
ShE	Sheridan coarse sandy loam, steep	80	90	40	90	26
ShD	Sheridan coarse sandy loam, moderately steep	80	90	75	90	49
SkA	Soquel loam, nearly level	100	100	100	100	100
SkB	Soquel loam, gently sloping	100	100	95	100	95
SkC2	Soquel loam, sloping, eroded	100	100	85	90	76
SoA	Soquel loam, over clay, nearly level	90	100	100	100	90
SrA	Soquel loam, over clay, nearly level, poorly drained	90	100	100	30	21, [2] 81
SsA	Soquel loam, over clay, nearly level, imperfectly drained	90	100	100	90	81
SmA	Soquel loam, nearly level, imperfectly drained	100	100	100	90	90
SpB	Soquel loam, gently sloping, poorly drained	100	100	95	70	68
Sd	Stabilized dune land					[1] 7
SwD2	Sweeney clay loam, moderately steep, eroded	60	85	75	90	34
SwC2	Sweeney clay loam, sloping, eroded	60	85	85	90	39
SwE2	Sweeney clay loam, steep, eroded	60	85	40	90	18
SwF2	Sweeney clay loam, very steep, eroded	60	85	20	90	10
SwF3	Sweeney clay loam, steep and very steep, severely eroded	60	85	30	60	9
SxC2	Sweeney clay loam, deep, sloping, eroded	70	85	85	90	46
SxD2	Sweeney clay loam, deep, moderately steep, eroded	70	85	75	90	40

See footnotes at end of table.

TABLE 5.—*Storie index rating for soils of the San Mateo Area, Calif.*—Continued

Map symbol	Soil	Soil rating factors				Index rating
		A (profile)	B (texture)	C (slope)	X (other conditions)	
						Percent
SzD2	Sweeney stony clay loam, moderately steep, eroded	60	70	75	90	28
SzE2	Sweeney stony clay loam, steep, eroded	60	70	40	90	15
SzF2	Sweeney stony clay loam, very steep, eroded	60	70	20	90	8
StC	Sweeney clay, sloping	60	60	85	100	31
StD2	Sweeney clay, moderately steep, eroded	60	60	75	90	24
SyC2	Sweeney loam, sloping, eroded	60	100	85	90	46
SyD2	Sweeney loam, moderately steep, eroded	60	100	75	90	40
SyE2	Sweeney loam, steep, eroded	60	100	40	90	22
SyF2	Sweeney loam, very steep, eroded	60	100	20	90	11
Ta	Terrace escarpments					[1] 5
TeD2	Tierra loam, moderately steep, eroded	60	100	75	85	38
TeB	Tierra loam, gently sloping	60	100	95	95	54
TeC2	Tierra loam, sloping, eroded	60	100	85	85	43
TeE3	Tierra loam, steep, severely eroded	60	100	40	55	13
TeE2	Tierra loam, steep, eroded	60	100	40	85	20
TeD3	Tierra loam, moderately steep, severely eroded	60	100	75	55	25
TmC2	Tierra sandy loam, sloping, eroded	60	95	85	90	44
TmD2	Tierra sandy loam, moderately steep, eroded	60	95	75	90	38
TcC2	Tierra clay loam, sloping, eroded	60	85	85	85	37
TcD2	Tierra clay loam, moderately steep, eroded	60	85	75	85	32
TsB	Tierra sandy loam, acid variant, gently sloping	60	95	95	95	51
TsC2	Tierra sandy loam, acid variant, sloping, eroded	60	95	85	85	41
TsD2	Tierra sandy loam, acid variant, moderately steep, eroded	60	95	75	85	36
TsE3	Tierra sandy loam, acid variant, steep, severely eroded	60	95	40	55	13
TuC2	Tunitas clay loam, sloping, eroded	85	85	85	90	56
TuA	Tunitas clay loam, nearly level	85	85	100	100	72
TuB	Tunitas clay loam, gently sloping	85	85	95	100	68
TuD2	Tunitas clay loam, moderately steep, eroded	85	85	75	90	49
TwA	Tunitas clay loam, nearly level, imperfectly drained	85	85	100	90	65
TwB	Tunitas clay loam, gently sloping, imperfectly drained	85	85	95	90	62
TxA	Tunitas loam, nearly level	85	100	100	100	85
TxB	Tunitas loam, gently sloping	85	100	95	100	81
TxC2	Tunitas loam, sloping, eroded	85	100	85	90	65
WmC2	Watsonville loam, sloping, eroded	60	100	85	85	43
WmB2	Watsonville loam, gently sloping, eroded	60	100	95	85	48
WmD2	Watsonville loam, moderately steep, eroded	60	100	75	85	38
WmA	Watsonville loam, nearly level	60	100	100	90	54
WmB	Watsonville loam, gently sloping	60	100	95	90	51
WmC3	Watsonville loam, sloping, severely eroded	60	100	85	60	31
WmE3	Watsonville loam, moderately steep and steep, severely eroded	60	100	58	60	21
WnA	Watsonville loam, nearly level, poorly drained	60	100	100	35	21
WnB	Watsonville loam, gently sloping, poorly drained	60	100	95	35	20
WaA	Watsonville clay loam, nearly level	60	85	100	95	48
WaB	Watsonville clay loam, gently sloping	60	85	95	95	46
WaC2	Watsonville clay loam, sloping, eroded	60	85	85	90	39
WsC2	Watsonville sandy loam, sloping, eroded	60	95	85	85	41
WsB2	Watsonville sandy loam, gently sloping, eroded	60	95	95	85	46
WsB	Watsonville sandy loam, gently sloping	60	95	95	90	49
WsD2	Watsonville sandy loam, moderately steep, eroded	60	95	75	85	36
WtB2	Watsonville sandy loam, thick surface, gently sloping, eroded	80	95	95	85	61
WoB	Watsonville loamy sand, gently sloping, overblown	80	80	95	90	55

[1] Index rating estimated; rating factors not determined.

[2] Drained.

The index rating for a soil is obtained by multiplying the four factors, A, B, C, and X; thus, any one factor may dominate or control the final rating. As an example, a soil may have an excellent profile justifying a rating of 100 percent for factor A, excellent surface soil conditions justifying 100 percent for factor B, a smooth, nearly level surface justifying 100 percent for factor C, but a high accumulation of salts or alkali that would give a rating of 10 percent for factor X. Multiplying these four ratings gives an index rating of 10 for this soil. The high accumulation of salts would dominate the quality of the soil, render it unproductive for crops, and justify the low index rating of 10.

Soils are placed in grades according to their suitabilty for general intensive agriculture as shown by their Storie index ratings. The six grades and their range in index ratings are:

	Index rating
Grade 1	80 to 100
Grade 2	60 to 80
Grade 3	40 to 60
Grade 4	20 to 40
Grade 5	10 to 20
Grade 6	less than 10

Soils of grade 1 are excellent, or well suited to general intensive agriculture. Grade 2 soils are good and are also well suited to agriculture, although they are not so desirable as soils of grade 1. Grade 3 soils are only fairly well suited, grade 4 soils are poorly suited, and grade 5 soils are very poorly suited. Grade 6 consists of soils and land types that are not suited to agriculture.

Estimated Yields

Table 6 lists the soils of the Area and gives the suitability of each for the principal crops that are grown. In estimating the suitability of a soil for a particular crop, the following were considered: (1) The soil and climatic requirements of the crop; (2) the probable yield and quality of the crop under management commonly practiced in the Area; (3) the feasibility of irrigation; and (4) the probably productive life of the crop if it is a perennial.

Although yield is not the only factor considered in estimating suitability, it is a major factor. Table 7 gives estimated ranges in average yield of principal crops for the soils of the various suitabilities (Very poor, Poor, Fair, Good, Very good) given in table 6. A crop should not be attempted on soils that are very poorly suited to it, as a profitable yield is unlikely. However, a crop may succeed on poorly suited soils under very special management or as a noncommercial home garden crop.

Yield of a crop under common management practices on a soil of fair suitability for that crop is about the present average yield of the crop in the Area. Under crop and farm management commonly practiced in the Area, and with normal prices, farming on soils of good or very good suitability is likely to be successful.

TABLE 6.—*Relative suitability of soils for general intensive agriculture and for principal crops in the San Mateo Area, Calif.*[1]

Soil	Artichokes	Brussels sprouts	Barley (grain)	Flax (seed)	Oats (grain)	Grain hay (barley or oats)	Irrigated pasture	Range pasture		Timber
								Unfertilized	Fertilized	
Active dune land	VP	VP	VP	VP	VP	VP	VP	VP	VP	VP
Baywood sandy loam, gently sloping, eroded	F	VG	F	F	F	F	G	F	G	VP
Baywood sandy loam, sloping, eroded	P	G	F	F	F	F	G	F	G	VP
Baywood sandy loam, moderately steep, eroded	P	F	F	P	F	F	F	F	G	VP
Botella clay loam, nearly level	VG	VG	VG	VG	VG	VG	VG	G	VG	VP
Botella clay loam, gently sloping	G	G	VG	VG	VG	VG	VG	G	VG	VP
Botella clay loam, sloping, eroded	F	G	G	G	G	G	G	G	VG	VP
Botella loam, gently sloping	VG	G	G	G	G	VG	VG	G	VG	VP
Botella loam, sloping, eroded	G	F	G	G	G	G	G	G	VG	VP
Botella loam, nearly level, imperfectly drained	G	G	G	G	G	VG	VG	G	VG	VP
Botella loam, gently sloping, imperfectly drained	G	G	G	G	G	VG	VG	G	VG	VP
Botella loam, sloping, seeped	G	F	G	G	G	G	G	G	VG	VP
Botella loam, nearly level and gently sloping, poorly drained variant	F	F–P	F	F	F	F	G	G	VG	VP
Butano loam, steep	VP	VP	VP	VP	VP	VP	VP	P	F	F
Butano loam, moderately steep	VP	VP	VP	VP	VP	VP	VP	P	F	F
Butano loam, very steep	VP	VP	VP	VP	VP	VP	VP	P	P [2]	F
Butano shaly loam, very steep	VP	VP	VP	VP	VP	VP	VP	P	[2]	F
Cayucos clay loam, steep, eroded	VP	VP	P	P	P	P	F	G	VG	VP
Cayucos clay loam, sloping, eroded	F	F	G	G	G	G	G	G	VG	VP
Cayucos clay loam, moderately steep, eroded	P	F	F	F	F	F	F	G	VG	VP
Cayucos clay loam, very steep, eroded	VP	VP	VP	VP	VP	VP	VP	G	G [2]	VP
Cayucos clay loam, steep and very steep, severely eroded	VP	VP	VP	VP	VP	VP	VP	F	F [2]	VP
Cayucos clay loam, deep, sloping, eroded	F	F	G	G	G	G	G	G	VG	VP
Cayucos clay loam, deep, moderately steep, eroded	P	P	F	F	F	F	F	G	VG	VP
Cayucos clay, moderately steep, eroded	P	F	F	G	F	G	F	G	VG	VP
Cayucos stony clay loam, very steep, eroded	VP	VP	VP	VP	VP	VP	VP	F	F [2]	VP
Coastal beaches	VP	VP	VP	VP	VP	VP	VP	VP	VP	VP
Colma sandy loam, very steep, eroded	VP	VP	VP	VP	VP	VP	VP	F	F [2]	VP
Colma sandy loam, sloping, eroded	P	F	F	F	F	F	G	F	G	VP
Colma sandy loam, moderately steep, eroded	VP	VP	F	F	F	F	F	F	G	VP
Colma sandy loam, steep, eroded	VP	VP	P	P	P	P	P	F	G	VP
Colma sandy loam, steep and very steep, severely eroded	VP	VP	VP	VP	VP	VP	VP	P	P [2]	VP
Colma loam, sloping, eroded	P	F	F	F	F	F	G	F	G	VP
Colma loam, moderately steep, eroded	P	P	F–P	F–P	F–P	F	F	F	G	VP

See footnotes at end of table.

TABLE 6.—*Relative suitability of soils for general intensive agriculture and for principal crops in the San Mateo Area, Calif.*[1]—Continued

Soil	Artichokes	Brussels sprouts	Barley (grain)	Flax (seed)	Oats (grain)	Grain hay (barley or oats)	Irrigated pasture	Range pasture		Timber
								Unfertilized	Fertilized	
Colma loam, steep, eroded	VP	VP	P	P	P	P	P	F	G	VP
Colma loam, very steep, eroded	VP	VP	VP	VP	VP	VP	VP	F	F [2]	VP
Coquille loam, nearly level, saline	VP	VP	VP	VP	VP	VP	P	P	P [2]	VP
Corralitos sandy loam, nearly level	VG	VG	G	G	G	G	G	F	G	G
Corralitos sandy loam, gently sloping	G	VG	G	G	G	G	G	F	G	G
Corralitos sandy loam, over gravel, gently sloping	F	G	F	F	F	F	G	F	G	F
Corralitos sandy loam, nearly level, imperfectly drained	G	G	G	G	G	G	G	F	G	G
Corralitos sandy loam, gently sloping, imperfectly drained	G	G	G	G	G	G	G	F	G	G
Corralitos sandy loam, over gravel, nearly level, imperfectly drained	F	G	F	F	F	F	G	F	G	G
Corralitos sandy loam, over clay, nearly level, imperfectly drained	G	G	G	G	G	G	G	F	G	F
Corralitos loamy sand, nearly level, imperfectly drained	F	G	F	F	F	F	G	F	F	P
Denison clay loam, nearly level	VG	VG	VG	VG	VG	VG	VG	G	VG	VP
Denison clay loam, nearly level, imperfectly drained	F	G	G	G	G	VG	VG	G	VG	VP
Denison loam, nearly level	G	VG	VG	VG	VG	VG	VG	G	VG	VP
Denison loam, gently sloping	G	G	VG	VG	VG	VG	VG	G	VG	VP
Denison loam, sloping	F	G	G	G	G	G	VG	G	VG	VP
Denison coarse sandy loam, nearly level	F	G	F	F	F	G	G	F	G	VP
Dublin clay, nearly level	F	F	G	G	G	VG	VG	G	VG	VP
Dublin clay, gently sloping	G	F	G	G	G	VG	VG	G	VG	VP
Dublin clay, sloping, eroded	F	F	G	G	G	G	VG	G	VG	VP
Dublin clay, moderately steep, eroded	P	F	G	F	G	G	G	G	VG	VP
Dublin clay, nearly level, imperfectly drained	F	F	G	G	G	VG	VG	G	VG	VP
Dublin clay, gently sloping, imperfectly drained	F	F	G	G	G	VG	VG	G	VG	VP
Elkhorn sandy loam, sloping, eroded	P	G	F	F	F	F	F	F	G	VP
Elkhorn sandy loam, gently sloping	F	VG	F	F	F	F	G	F	G	VP
Elkhorn sandy loam, gently sloping, eroded	F	G	F	F	F	F	G	F	G	VP
Elkhorn sandy loam, moderately steep, eroded	P	G	P	P	P	F	F	F	G	VP
Elkhorn sandy loam, moderately steep and steep, severely eroded	VP	P	VP	VP	VP	P	P	P	F	VP
Elkhorn sandy loam, thick surface, gently sloping	F	VG	F	F	F	F	G	F	G	VP
Elkhorn sandy loam, thick surface, sloping, eroded	F	G	F	F	F	F	F	F	G	VP
Farallone coarse sandy loam, nearly level	VG	VG	F	G	F	F	G	F	G	VP
Farallone coarse sandy loam, gently sloping	G	VG	F	G	F	F	G	F	G	VP
Farallone coarse sandy loam, sloping, eroded	F	G	F	G	F	F	G	F	G	VP
Farallone coarse sandy loam, moderately steep, eroded	P	F	F	F	F	F	F	F	G	VP
Farallone coarse sandy loam, over coarse sands, gently sloping, seeped	F	F	F	F	F	F	F	F	G	VP
Farallone loam, nearly level	VG	VG	G	G	G	G	G	G	VG	VP
Farallone loam, gently sloping	G	VG	G	G	G	G	G	G	VG	VP
Farallone loamy coarse sand, gently sloping	F	G	F	F	F	F	F	F	G	VP
Farallone loamy coarse sand, sloping, eroded	F	G	F	F	F	F	F	F	G	VP
Gazos loam, very steep, eroded	VP	VP	VP	VP	VP	VP	VP	F	F [2]	VP
Gazos loam, sloping, eroded	P	F	F	F	F	F	F	F	G	VP
Gazos loam, moderately steep, eroded	VP	P	P	F	P	F	F	F	G	VP
Gazos loam, steep, eroded	VP	VP	VP	VP	VP	P	P	F	G	VP
Gazos loam, moderately steep, severely eroded	VP	VP	VP	VP	VP	VP	P	P	F	VP
Gazos loam, dark, sloping, eroded	P	F	F	F	F	F	F	F	G	VP
Gazos fine sandy loam, moderately steep, eroded	VP	P	P	P	P	F	F	F	G	VP

See footnotes at end of table.

TABLE 6.—*Relative suitability of soils for general intensive agriculture and for principal crops in the San Mateo Area, Calif.*[1]—Continued

Soil	Artichokes	Brussels sprouts	Barley (grain)	Flax (seed)	Oats (grain)	Grain hay (barley or oats)	Irrigated pasture	Range pasture		Timber
								Unfertilized	Fertilized	
Gazos fine sandy loam, steep, eroded	VP	VP	VP	VP	VP	P	P	F	G	VP
Gazos-Lobitos silt loams, gently sloping	P	F	F	F	F	F	F	F	G	VP
Gazos-Lobitos silt loams, sloping, eroded	P	F	F	F	F	F	F	F	G	VP
Gazos-Lobitos silt loams, moderately steep, eroded	VP	VP	P	F	P	F	F	F	G	VP
Gazos-Lobitos silt loams, very steep	VP	VP	VP	VP	VP	VP	VP	P	P [2]	VP
Gazos-Lobitos silt loams, steep, eroded	VP	VP	VP	VP	VP	P	P	F	G	VP
Gazos and Lobitos stony loams, steep, eroded	VP	VP	VP	VP	VP	VP	VP	P	P	VP
Gazos and Lobitos stony loams, very steep, eroded	VP	VP	VP	VP	VP	VP	VP	VP	VP	VP
Gazos and Lobitos soils, steep and very steep, severely eroded	VP	VP	VP	VP	VP	VP	VP	P	F	VP
Gazos (dark phase)–Calera loams, sloping, eroded	VP	P	F	F	F	F	F	F	G	VP
Gazos (dark phase)–Calera loams, steep, eroded	VP	VP	VP	VP	VP	P	P	F	G	VP
Gazos (dark phase)–Calera loams, very steep, eroded	VP	VP	VP	VP	VP	VP	VP	F	F [2]	VP
Gazos (dark phase)–Sweeney loams, steep, eroded	VP	VP	VP	VP	VP	P	P	F	G	VP
Gullied land (alluvial soil material)	VP	VP	VP	VP	VP	VP	VP	VP	VP	VP
Gullied land (Gazos-Lobitos soil material)	VP	VP	VP	VP	VP	VP	VP	VP	VP	VP
Gullied land (Tierra and Watsonville soil materials)	VP	VP	VP	VP	VP	VP	VP	VP	VP	VP
Hugo and Josephine sandy loams, very steep	VP	VP	VP	VP	VP	VP	VP [3]	P	P [2]	F
Hugo and Josephine sandy loams, very steep, eroded	VP	VP	VP	VP	VP	VP	VP [3]	P	P [2]	P
Hugo and Josephine sandy loams, steep, eroded	VP	VP	VP	VP	VP	VP	VP [3]	P	F	P
Hugo and Josephine sandy loams, steep	VP	VP	VP	VP	VP	VP	VP [3]	P	F	F
Hugo and Josephine sandy loams, moderately steep, eroded	VP	VP	P	F–P	P	F–P	P [3]	F	G	P
Hugo and Josephine sandy loams, sloping, eroded	VP	VP	F	F	F	F	F [3]	F	G	F
Hugo and Josephine sandy loams, very deep, sloping	P	F	F	F	F	G	G [3]	F	G	F
Hugo and Josephine sandy loams, very deep, moderately steep	VP	P	F	F	F	G	F	F	G	F
Hugo and Josephine loams, sloping	VP	P	F	F	F	F	F [3]	F	G	F
Hugo and Josephine loams, moderately steep	VP	VP	P	P	P	F–P	F [3]	F	G	F
Hugo and Josephine loams, moderately steep, eroded	VP	VP	P	P	P	F–P	P [3]	F	G	F
Hugo and Josephine loams, steep	VP	VP	VP	VP	VP	VP	VP [3]	P	F	F
Hugo and Josephine loams, steep, eroded	VP	VP	VP	VP	VP	VP	VP [3]	P	F	P
Hugo and Josephine loams, very steep	VP	VP	VP	VP	VP	VP	VP [3]	P	P [2]	F
Hugo and Josephine loams, very deep, gently sloping	VP	VP	F	F	F	F	G [3]	F	G	G
Hugo and Josephine loams, very deep, sloping	VP	VP	F	F	F	F	G [3]	F	G	G
Laughlin loam, steep, eroded	VP	VP	VP	VP	VP	VP	VP	F	G	VP
Laughlin loam, very steep, eroded	VP	VP	VP	VP	VP	VP	VP	F	F [2]	VP
Laughlin loam, moderately steep, eroded	VP	P	P	P	P	P–F	F	F	G	VP
Laughlin loam, sloping, eroded	P	F	F	F	F	F	F	F	G	VP
Laughlin-Sweeney loams, sloping, eroded	VP	P	F	F	F	F	F	F	G	VP
Laughlin-Sweeney loams, moderately steep, eroded	VP	VP	F	F	F	F	F	F	G	VP
Laughlin-Sweeney loams, steep, eroded	VP	VP	VP	VP	VP	P	P	F	G	VP
Laughlin-Sweeney loams, very steep, eroded	VP	VP	VP	VP	VP	VP	VP	F	F [2]	VP
Lobitos loam, steep, eroded	VP	VP	VP	VP	VP	P	P	F	G	VP
Lobitos loam, very steep, eroded	VP	VP	VP	VP	VP	VP	VP	F	F [2]	VP
Lobitos loam, moderately steep, eroded	VP	P [2]	F	F	F	F	F	F	G	VP
Lobitos loam, sloping, eroded	P [3]	F [2]	F	F	F	F	F	F	G	VP

See footnotes at end of table.

TABLE 6.—*Relative suitability of soils for general intensive agriculture and for principal crops in the San Mateo Area, Calif.*[1]—Continued

Soil	Artichokes	Brussels sprouts	Barley (grain)	Flax (seed)	Oats (grain)	Grain hay (barley or oats)	Irrigated pasture	Range pasture		Timber
								Unfertilized	Fertilized	
Lobitos loam, deep, moderately steep, eroded	VP	P	F	F	F	F	F	F	G	VP
Lobitos loam, deep, sloping, eroded	P[3]	F	F	F	F	F	F	F	G	VP
Lobitos fine sandy loam, sloping, eroded	P	F	F	F	F	F	F	F	G	VP
Lobitos fine sandy loam, moderately steep, eroded	VP	P	F	F	F	F	F	F	G	VP
Lobitos fine sandy loam, steep, eroded	VP	VP	VP	VP	VP	P	P	F	G	VP
Lockwood loam, gently sloping	G	G	G	VG	G	G	VG	G	VG	VP
Lockwood loam, sloping, eroded	F	G	G	G	G	G	G	G	VG	VP
Lockwood loam, gently sloping, seeped	F	G	G	G	G	G	VG	G	VG	VP
Lockwood loam, sloping, seeped	P	F	G	G	G	G	G	G	VG	VP
Lockwood loam, nearly level, imperfectly drained	F	F	G	G	G	G	VG	G	VG	VP
Lockwood shaly loam, gently sloping	G	G	G	VG	G	G	VG	G	VG	VP
Lockwood loam, brown subsoil variant, gently sloping, eroded	P	F	F	G	F	F	G	F	G	VP
Lockwood loam, brown subsoil variant, sloping, eroded	P	F	F	F	F	F	F	F	G	VP
Lockwood loam, brown subsoil variant, moderately steep, eroded	VP	P	P	F	P	F	F	F	G	VP
Los Gatos loam, very steep	VP	VP	VP	VP	VP	VP	VP	F	F[2]	VP
Los Gatos clay loam, sloping, eroded	VP	VP	F	F	F	F	F	F	G	VP
Los Gatos clay loam, steep, eroded	VP	VP	VP	VP	VP	P	P	F	G	VP
Mindego clay loam, very steep	VP	VP	VP	VP	VP	VP	VP	F	F[2]	G
Mindego clay loam, steep	VP	VP	VP	VP	VP	P	P	F	G	G
Mindego stony clay loam, very steep	VP	VP	VP	VP	VP	VP	VP	F	F[2]	G
Miramar coarse sandy loam, steep, eroded	VP	VP	VP	VP	VP	VP	VP	F	G	VP
Miramar coarse sandy loam, sloping, eroded	P	F	F	F	F	F	F	F	G	VP
Miramar coarse sandy loam, moderately steep, eroded	VP	P	P	P	P	P	P	F	G	VP
Miramar coarse sandy loam, steep, severely eroded	VP	VP	VP	VP	VP	VP	VP	P	P[2]	VP
Miramar coarse sandy loam, very steep, eroded	VP	VP	VP	VP	VP	VP	VP	P	P[2]	VP
Mixed alluvial land	VP	VP	VP	VP	VP	VP	VP	VP	VP	VP
Montara stony loam, steep and very steep, eroded	VP	VP	VP	VP	VP	VP	VP	F	F[2]	VP
Pomponio loam, moderately steep, eroded	VP	P	F	F	F	F	F	F	G	VP
Pomponio loam, sloping, eroded	P	F	F	F	F	F	F	F	G	VP
Pomponio loam, steep, eroded	VP	VP	VP	VP	VP	P	P	F	G	VP
Pomponio clay loam, sloping, eroded	P	F	F	F	F	F	F	F	G	VP
Pomponio clay loam, moderately steep, eroded	VP	P	F	F	F	F	F	F	G	VP
Rough broken land	VP	VP	VP	VP	VP	VP	VP	VP	VP	VP
Santa Lucia loam, very steep, eroded	VP	VP	VP	VP	VP	VP	VP	F	F[2]	VP
Santa Lucia loam, sloping, eroded	P	F	F	F	F	F	F	F	G	VP
Santa Lucia loam, moderately steep, eroded	VP	P	P	F	P	P	F	F	G	VP
Santa Lucia loam, steep, eroded	VP	VP	VP	P	VP	P	P	F	G	VP
Santa Lucia loam, steep and very steep, severely eroded	VP	VP	VP	VP	VP	VP	VP	P	P[2]	VP
Santa Lucia stony loam, steep, eroded	VP	VP	VP	VP	VP	VP	VP	P	F	VP
Santa Lucia stony loam, very steep, eroded	VP	VP	VP	VP	VP	VP	VP	P	P[2]	VP
Santa Lucia stony loam, steep and very steep, severely eroded	VP	VP	VP	VP	VP	VP	VP	P	P[2]	VP
Santa Lucia stony loam, very shallow, steep and very steep, severely eroded	VP	VP	VP	VP	VP	VP	VP	P	P[2]	VP
Sheridan coarse sandy loam, very steep	VP	VP	VP	VP	VP	VP	VP	P	P[2]	F
Sheridan coarse sandy loam, steep	VP	VP	VP	VP	VP	VP	VP	F	F[2]	F
Sheridan coarse sandy loam, moderately steep	VP	VP	VP	P	VP	P	P	F	G	F
Soquel loam, nearly level	VG	VG	VG	VG	VG	VG	VG	G	VG	VG
Soquel loam, gently sloping	VG	VG	VG	VG	VG	VG	VG	G	VG	VG
Soquel loam, sloping, eroded	G	G	G	G	G	G	VG	G	VG	G

See footnotes at end of table.

TABLE 6.—*Relative suitability of soils for general intensive agriculture and for principal crops in the San Mateo Area, Calif.*[1]—Continued

Soil	Artichokes	Brussels sprouts	Barley (grain)	Flax (seed)	Oats (grain)	Grain hay (barley or oats)	Irrigated pasture	Range pasture		Timber
								Unfertilized	Fertilized	
Soquel loam, over clay, nearly level	VG	VG	VG	VG	VG	VG	VG	G	VG	G
Soquel loam, over clay, nearly level, poorly drained	P	F	F	F	F	G	G	F	G	P
Soquel loam, over clay, nearly level, imperfectly drained	G	G	G	G	G	VG	VG	G	VG	G
Soquel loam, nearly level, imperfectly drained	G	G	G	G	G	VG	VG	G	VG	G
Soquel loam, gently sloping, poorly drained	P	F	F	F	F	G	G	F	G	P
Stabilized dune land	VP	VP	VP	VP	VP	VP	P	VP	VP	VP
Sweeney clay loam, moderately steep, eroded	VP	P	F	F	F	F	F	G	VG	VP
Sweeney clay loam, sloping, eroded	P	F	G	G	G	G	G	G	VG	VP
Sweeney clay loam, steep, eroded	VP	VP	VP	VP	VP	P	P	G	VG	VP
Sweeney clay loam, very steep, eroded	VP	VP	VP	VP	VP	VP	VP	G	G[2]	VP
Sweeney clay loam, steep and very steep, severely eroded	VP	VP	VP	VP	VP	VP	VP	F	F[2]	VP
Sweeney clay loam, deep, sloping, eroded	P	F	G	F	G	G	G	G	VG	VP
Sweeney clay loam, deep, moderately steep, eroded	VP	P	F	F	F	G	G	G	VG	VP
Sweeney stony clay loam, moderately steep, eroded	VP	VP	VP	VP	VP	P	P	F	G	VP
Sweeney stony clay loam, steep, eroded	VP	VP	VP	VP	VP	VP	VP	F	G	VP
Sweeney stony clay loam, very steep, eroded	VP	VP	VP	VP	VP	VP	VP	F	F[2]	VP
Sweeney clay, sloping	P	F	G	F	G	G	VG	G	VG	VP
Sweeney clay, moderately steep, eroded	VP	P	F	F	F	G	G	G	VG	VP
Sweeney loam, sloping, eroded	P	F	F	F	F	G	G	G	VG	VP
Sweeney loam, moderatley steep eroded	VP	P	P	P	P	F	F	G	VG	VP
Sweeney loam, steep, eroded	VP	VP	VP	VP	VP	P	P	G	VG	VP
Sweeney loam, very steep, eroded	VP	VP	VP	VP	VP	VP	VP	G	G[2]	VP
Terrace escarpments	VP	VP	VP	VP	VP	VP	VP	VP	VP	VP
Tierra loam, moderately steep, eroded	VP	P	P	P	P	F	F	F	G	VP
Tierra loam, gently sloping	P	F	F	F	F	F	F	F	G	VP
Tierra loam, sloping, eroded	P	F	F	F	F	F	F	F	G	VP
Tierra loam, steep, severely eroded	VP	VP	VP	VP	VP	VP	VP	P	F	VP
Tierra loam, steep, eroded	VP	VP	VP	VP	VP	P	P	F	G	VP
Tierra loam, moderately steep, severely eroded	VP	VP	P	P	P	F	F	P	F	VP
Tierra sandy loam, sloping, eroded	P	F	F	F	F	F	F	F	G	VP
Tierra sandy loam, moderately steep, eroded	VP	P	P	F	P	F	F	F	G	VP
Tierra clay loam, sloping, eroded	P	F	F	F	F	F	F	F	G	VP
Tierra clay loam, moderately steep, eroded	VP	F	F	P	F	F	F	F	G	VP
Tierra sandy loam, acid variant, gently sloping	P	F	F	F	F	F	G	F	G	VP
Tierra sandy loam, acid variant, sloping, eroded	P	F	F	F	F	G	G	F	G	VP
Tierra sandy loam, acid variant, moderately steep, eroded	VP	P	P	P	P	F	F	F	G	VP
Tierra sandy loam, acid variant, steep, severely eroded	VP	VP	VP	VP	VP	VP	VP	P	F	VP
Tunitas clay loam, sloping, eroded	P	F	G	F	G	G	G	G	VG	VP
Tunitas clay loam, nearly level	G	F	G	G	G	G	VG	G	VG	VP
Tunitas clay loam, gently sloping	F	F	G	G	G	G	VG	G	VG	VP
Tunitas clay loam, moderately steep, eroded	P	P	F	F	F	G	G	G	VG	VP
Tunitas clay loam, nearly level, imperfectly drained	F	F	G	G	G	G	VG	G	VG	VP
Tunitas clay loam, gently sloping, imperfectly drained	F	F	G	G	G	G	VG	G	VG	VP
Tunitas loam, nearly level	G	G	F	G	F	G	VG	G	VG	VP
Tunitas loam, gently sloping	F	F	F	G	F	G	VG	G	VG	VP
Tunitas loam, sloping, eroded	P	F	F	F	F	G	G	G	VG	VP
Watsonville loam, sloping, eroded	P	F	F	F	F	F	F	F	G	VP
Watsonville loam, gently sloping, eroded	P	F	F	F	F	F	F	F	G	VP
Watsonville loam, moderately steep, eroded	VP	P	P	P	P	P	F	F	G	VP

See footnotes at end of table.

TABLE 6.—*Relative suitability of soils for general intensive agriculture and for principal crops in the San Mateo Area, Calif.*[1]—Continued

Soil	Artichokes	Brussels sprouts	Barley (grain)	Flax (seed)	Oats (grain)	Grain hay (barley or oats)	Irrigated pasture	Range pasture		Timber
								Unfertilized	Fertilized	
Watsonville loam, nearly level	P	F	F	F	F	F	F	F	G	VP
Watsonville loam, gently sloping	P	F	F	F	F	F	F	F	G	VP
Watsonville loam, sloping, severely eroded	P	P	P	P	P	P	F	P	F	VP
Watsonville loam, moderately steep and steep, severely eroded	VP	VP	P	P	P	P	P	P	F	VP
Watsonville loam, nearly level, poorly drained	VP	P	P	P	P	F	F	P	G	VP
Watsonville loam, gently sloping, poorly drained	VP	P	P	P	P	F	F	F	G	VP
Watsonville clay loam, nearly level	P	F	F	F	F	F	G	F	G	VP
Watsonville clay loam, gently sloping	P	F	F	F	F	F	G	F	G	VP
Watsonville clay loam, sloping, eroded	P	F	F	F	F	F	G	F	G	VP
Watsonville sandy loam, sloping, eroded	P	F	F	F	F	F	F	F	G	VP
Watsonville sandy loam, gently sloping, eroded	P	F	F	F	F	F	F	F	G	VP
Watsonville sandy loam, gently sloping	P	F	F	F	F	F	F	F	G	VP
Watsonville sandy loam, moderately steep, eroded	VP	P	P	P	P	F	F	F	G	VP
Watsonville sandy loam, thick surface, gently sloping, eroded	F	F	F	F	F	F	F	F	G	VP
Watsonville loamy sand, gently sloping, overblown	P	F	P	F	P	F	F	F	G	VP

[1] Caution must be used in applying the ratings in this table to specific sites. Climate or proximity to the coast affects management practices greatly, as well as the yield of a number of crops, especially artichokes and brussels sprouts. Likewise, elevation affects the period of growth and the production of range plants considerably. As nearly as can be judged, these suitability ratings are representative of the most extensive areas of the specified soil.

[2] Fertilizing practices not now practical.

[3] Ratings apply to areas that have been cleared; most Hugo and Josephine soils are in timber.

TABLE 7.—*Estimated range in average yields per acre of principal crops under present management on soils of various suitabilities for crop production in the San Mateo Area, California*

Crop	Estimated yields for soil rated in table 6 as—				
	Very poor	Poor	Fair	Good	Very good
Artichokes, boxes [1]	(2)	<100	100–200	200–300	>300
Brussels sprouts, tons	(2)	<2½	2. 5–4. 0	4–6	>6
Barley (grain), 100 lb. sacks	(2)	<9	9–15	15–18	>18
Oats (grain), 100 lb. sacks	(2)	<7	7–12	12–15	>15
Flax (seed), bushels [3]	(2)	<8	8–15	15–20	>20
Hay (barley, oats, and volunteer), tons		<¾	¾–1½	1½–2	>2
Pasture: Irrigated [4], animal unit months [5]	(2)	<8	8–12	12–16	>16
Range:					
Nonfertilized [6], animal unit months [5]	(2)	<1	1–2	2–3	>3
Fertilized [7], animal unit months [5]	(2)	<3½	3½–5	5–7	>7
Timber [8], bd. ft. per acre each year	(2)	135–410	410–725	725–1, 020	>1, 020

[1] Generally, about 24 pounds.

[2] Crop not suited, very low yields, or no yields of commercial importance.

[3] One bushel of flaxseed generally weighs about 52 pounds.

[4] Irrigated pasture rated under the following conditions: (1) 8-month grazing season; (2) nitrogen and phosphate applied during the year, according to recommended local practices; (3) no grazing when soil is wet; (4) grazing rotated; (5) weeds mowed, as necessary, and brush controlled; (6) dragging used to spread manure; (7) grazing deferred for 6 to 8 weeks every other year to permit plants to produce seed.

[5] The term "animal unit months" is used to express the carrying capacity of pasture or range. It equals the number of animal units to the acre multiplied by the number of months of grazing. One animal unit is a cow, steer, or horse, or five sheep.

[6] Unfertilized range rated under the following conditions: (1) Grazing season about 6 months long (from end of January to early in July with the equivalent of 1 month of dry forage in fall); (2) no fertilizer added; (3) no rotation, deferred grazing, or control of weeds and brush; and (4) no spreading of manure.

[7] Fertilized range rated under the following conditions: (1) Grazing season about 7 months long (from middle of January to middle of July with the equivalent of 1 month of dry forage in fall); (2) nitrogen and phosphate, as recommended, broadcast in fall; (3) rotation grazing practiced; (4) weeds and brush controlled; and (5) no spreading of manure.

[8] For even-aged, fully stocked, unmanaged stands of Douglas-fir and redwood, producing trees 12 inches d.b.h. and larger at 80 years of age. Volumes by Scribner decimal C log rule (reference (*11*) for yield and site indices).

Engineering Interpretations [2]

The soil survey map and report are useful for many engineering purposes. Each kind of soil is described in the section, Descriptions of Soils. The description of each soil applies to that soil wherever it is located, and the map shows the kind of soil at every place in the surveyed area. The information about soil properties is not specific or detailed enough, however, for all engineering needs and is no substitute for investigations of the site and tests of soil samples where a road or other structure is to be built. This section suggests how soils information, useful for engineering interpretations, can be obtained from the soil survey map and report. It does not attempt to give interpretations of the different soils for irrigation, drainage, or other engineering work.

Samples from representative sites of five different soil series were tested in two engineering laboratories. At each site three major horizons (layers) in the soil profile were sampled. Samples of a soil of the Sweeney series and one of the Watsonville series were tested in the laboratory of the Bureau of Public Roads in Washington, D.C. Samples of one soil each of the Denison, Tierra, and Elkhorn series were tested by the Soil Conservation Service at Riverside, Calif.

Results of the tests and two engineering classifications of each soil sample are given in table 8.

Most highway engineers classify soil materials in a system approved by the American Association of State Highway Officials (AASHO). Many engineers, including many who work on the design of dams and embankments, prefer the Unified soil classification. These classifications are explained in publications (*2*, *26*). A brief explanation of each of them has also been published in a bulletin of the Portland Cement Association (*15*).

Performance characteristics of horizons in the profile of each soil that was tested are summarized in table 9. These characteristics suggest how the soil will behave and will influence the design and construction of embankments.

Engineers and soil scientists of the Soil Conservation Service have classified the major soil series into four hydrologic groups. The grouping is based on data and estimates of the intake of water during the latter part of a storm of long duration, after the soil is wet and has had an opportunity to swell, without the protective effect

[2] This section was prepared by HUGO T. SHOGREN, assistant conservation engineer, California, Soil Conservation Service.

TABLE 8.—*Engineering test data for soil samples*

Soil name and location	Parent material	Laboratory number (Riverside)	Bureau of Public Roads report number	Depth	Horizon	Mechanical			
						Percentage passing sieve			
						No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 60 (0.25 mm.)	No. 200 (0.74 mm.)
Denison clay loam:				*Inches*					
0.41 mile N. of Miramar Hotel, Miramar, and 125 ft. E. of sea cliff.	Alluvium from quartz diorite.	55104	----------	4– 8	A_{12}	98	82	77	62
		55106	----------	16–29	B_{22}	99	86	82	71
		55109	----------	55–63	C_2	98	81	78	60
Tierra fine sandy loam:									
Machado Ranch, 1 mile S. of Tunitas Canyon, 900 ft. E. of Hwy. 1, and 60 ft. S. of trail.	Clayey coastal plain sediments.	55118	----------	7–13	A_{12}	100	99	97	55
		55122	----------	30–41	B_{22}	100	99	98	65
		55124	----------	50–60	C	100	99	98	59
Elkhorn fine sandy loam:									
1.5 miles SW. of Pescadero, ¼ mile SW. of radio antenna, and ¼ mile E. of Hwy. 1.	Sandy coastal plain sediments.	55126	----------	6–14	A_{12}	100	90	72	36
		55128	----------	26–40	B_{21}	100	92	75	43
		55130	----------	50–60	B_3	100	92	74	45
Sweeney clay loam:									
4.5 miles S. of Sky Londa and W. side of Hwy. 5.	Basaltic material (diabase).	55373	94222	0– 7	A_1	100	97	91	62
		55374	94223	7–16	B_2	100	97	91	63
		55377	94224	33–45	C_{21}	100	88	77	44
Watsonville loam:									
2 miles SW. of Half Moon Bay and 100 ft. N. of Rose Road at ocean.	Marine sediments.	55387	94228	0– 9	A_{11}	98	94	90	70
		55389	94229	12–21	B_{21}	100	98	95	83
		55393	94230	54–64	C	98	90	84	62

[1] Mechanical analysis of Denison clay loam, Tierra fine sandy loam, and Elkhorn fine sandy loam performed by SCS Soil Survey Laboratory, Riverside, Calif., in accordance with standard procedures, which exclude material coarser than 2 mm. in diameter; percentages as tabulated have been adjusted to include that material coarser than 2 mm. in diameter to conform with gradations of the American Association of State Highway Officials (AASHO). Mechanical analysis of Sweeney clay loam and Watsonville loam performed by Bureau of Public Roads in accordance with standard AASHO procedures. Results by this procedure are not suitable for naming textural classes of soils.

[2] Liquid limit and plasticity index for the Denison, Tierra, and Elkhorn soils determined by Bureau of Public Roads Laboratory, San Francisco, Calif.

[3] Moisture-density determination by Bureau of Public Roads.

of any vegetation. The grouping is tentative and subject to change as further data and experience are obtained.

The four hydrologic groups and the soils in each of them are:

A. Soils that have a high infiltration rate even when thoroughly wetted; primarily deep, well-drained sands and gravels that contain very little silt or clay. These soils have a high rate of water transmission and a low runoff potential.

Baywood. Corralitos. Farallone. Soquel.

B. Soils that have an above-average infiltration rate when thoroughly wetted; primarily moderately deep to deep, moderately well drained or well drained soils of moderately fine to moderately coarse texture. These soils have a moderate rate of water transmission.

Botella.
Gazos.
Hugo.
Josephine.
Lockwood.
Santa Lucia.
Sheridan.

C. Soils that have a below-average infiltration rate when thoroughly wetted; primarily soils containing a layer that impedes downward movement of water or soils of moderately fine to fine texture that have a slow infiltration rate. These soils have a slow rate of water transmission.

Butano.
Cayucos.
Denison.
Elkhorn.
Laughlin.
Lobitos.
Los Gatos.
Mindego.
Miramar.
Sweeney.
Tunitas.

D. Soils that have a very slow infiltration rate when thoroughly wetted; primarily (1) clay soils with high swelling potential, (2) soils that have a high permanent water table, (3) soils that have a claypan or a clay layer at or near the surface, and (4) shallow soils over nearly impervious materials. These soils have a very slow rate of water transmission.

Colma.
Coquille.
Dublin.
Montara.
Pomponio.
Tierra.
Tierra, acid variant.
Watsonville.

In descriptions of soils in this report, for example, the textural class is given of each layer in the soil profile. Each textural class is defined in terms of the proportions of grains of different size. A soil is named, however, by adding the textural class of the surface soil to the place name that denotes the soil series. From the name Botella

from five profiles, San Mateo County, Calif.

analysis [1]												
Percentage smaller than—					Liquid [2] limit	Plasticity [2] index	Moisture-density [3]		Density [4] in place	k Hydraulic [5] conductivity	Engineering soil classification	
0.05 mm.	0.02 mm.	0.005 mm.	0.002 mm.	0.001 mm.			Maximum dry density	Optimum moisture content			AASHO [6]	Unified [7]
							Lb. per cu. ft.	*Percent*	*Lb. per cu. ft.*	*In. per hr.*		
57	40	30	25	([8])	33	15	([8])	([8])	([8])	1. 0	A–6(7)	CL.
67	48	36	30	([8])	41	22	([8])	([8])	([8])	. 5	A–7–6(12)	CL.
54	35	27	24	([8])	29	15	([8])	([8])	([8])	. 1	A–6(7)	CL.
45	32	23	19	([8])	27	8	([8])	([8])	([8])	. 5	A–4(4)	CL.
59	47	39	36	([8])	53	36	([8])	([8])	98	. 005	A–7–6(16)	CH.
52	39	31	28	([8])	38	22	([8])	([8])	99	. 1	A–6(10)	CL.
32	18	12	10	([8])	15	([8])	([8])	([8])	95	1. 0	A–4(1)	SC.
40	30	24	22	([8])	29	16	([8])	([8])	102	. 25	A–6(3)	SC.
41	30	24	21	([8])	28	15	([8])	([8])	101	. 1	A–6(3)	SC.
55	43	32	25	22	40	15	105	19	83	2. 5	A–6(7)	CL.
56	46	36	30	25	42	18	104	20	92	. 6	A–7–6(9)	CL.
37	25	15	10	8	35	9	108	18	103	. 05	A–4(2)	SM.
63	37	24	20	16	29	7	105	16	90	. 4	A–4(7)	CL.
75	58	48	44	41	58	34	95	25	99	. 004	A–7–6(20)	CH.
54	39	28	23	19	34	16	112	15	101	. 1	A–6(8)	CL.

[4] Density in place by SCS from undisturbed core samples.
[5] Hydraulic conductivity classified by SCS from limited laboratory tests and field observations.
[6] AASHO classification by SCS in accordance with Classification of Soils and Soil-Aggregate Mixtures for Highway Construction Purposes, AASHO Designation M 145–49.
[7] Unified classification by SCS in accordance with Unified Soil Classification System, Tech. Memo. No. 3–357, v. 1, Waterways Expt. Sta. March 1953.
[8] Not determined.

TABLE 9.—*Engineering performance characteristics of soil samples taken from five profiles, San Mateo County, Calif.*

Soil	Depth	Characteristics of embankment materials [1]			Erodibility [2]
		Piping resistance	Susceptibility to cracking when compacted dry	Importance of moisture-density control	
	Inches				
Denison clay loam	4–8	3	2	3	L–M.
	16–29	2	5	4	
	55–63	4	1	2	
Tierra fine sandy loam	7–13	4	2	1	H.
	30–41	1	6	6	
	50–60	2	3	3	
Elkhorn fine sandy loam	6–14	6	2	1	H.
	26–40	4	1	2	
	50–60	4	1	2	
Sweeney clay loam	0–7	3	2	2	L.
	7–16	2	2	2	
	33–45	4	3	1	
Watsonville loam	0–9	4	2	1	H.
	12–21	1	6	6	
	54–64	2	2	2	

[1] Degree of resistance to piping, degree of susceptibility to cracking when compacted dry, and degree of relative importance of moisture control ranges from 1 (greatest) to 6 (least). Classified by SCS from information provided in Tech. Memo. No. 645, Bur. of Reclam., USDI (*16*), and from information in Paper No. 2351 Trans. Amer. Soc. Civ. Engin. 1948 (*10*).

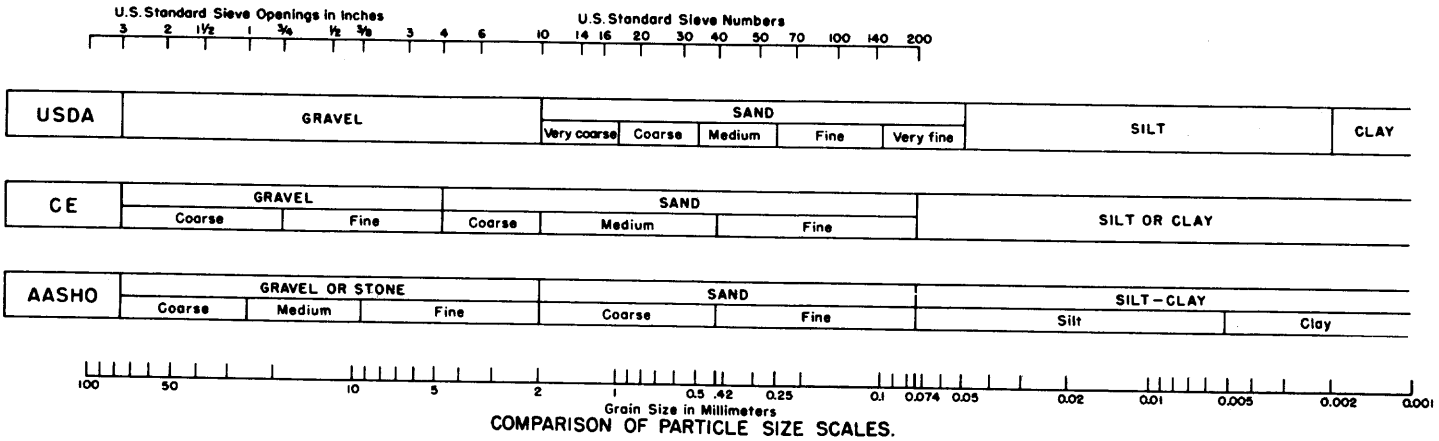
[2] Erodibility classified by SCS as L-low; M-medium; and H-high.

loam, for example, we know that the surface soil to plow depth is of loam texture, but we need to read the description of the soil series to find out the texture and other features of the subsoil.

A soil scientist describes the textural class and many other characteristics of each horizon in the soil profile. Descriptions of representative profiles in the San Mateo Area are given in the last section of this report. Engineers will note that many profiles contain several layers of soil that have different engineering classifications. They will also note that some of the descriptions do not cover in much detail the unconsolidated material, under the soil profile, that is regarded as substratum by a soil scientist but as soil by an engineer.

The liquid limit and plasticity index are important in predicting behavior of soil as engineering material and are used in arriving at the various engineering classifications. These properties have been measured for only the five soils listed in table 8. They can be estimated roughly for other soils from the descriptions of texture and consistence that are given by soil horizons for the representative profiles.

Figure 14 shows limits and names of the size classes of soil particles that are used by the United States Department of Agriculture (USDA); those of the Unified System as developed by the United States Corps of Engineers (CE); and those of the American Association of State Highway Officials (AASHO). Figure 15 shows the range in content of sand, silt, and clay fractions of each of the 12 main textural classes that are named by the United States Department of Agriculture. An engineer can read the description of any soil in this report, refer to this chart, and thus have some basis to judge the approximate classification of each horizon in the Unified or the AASHO system.



COMPARISON OF PARTICLE SIZE SCALES.

Figure 14.—**Comparison of size classes of soil grains.**

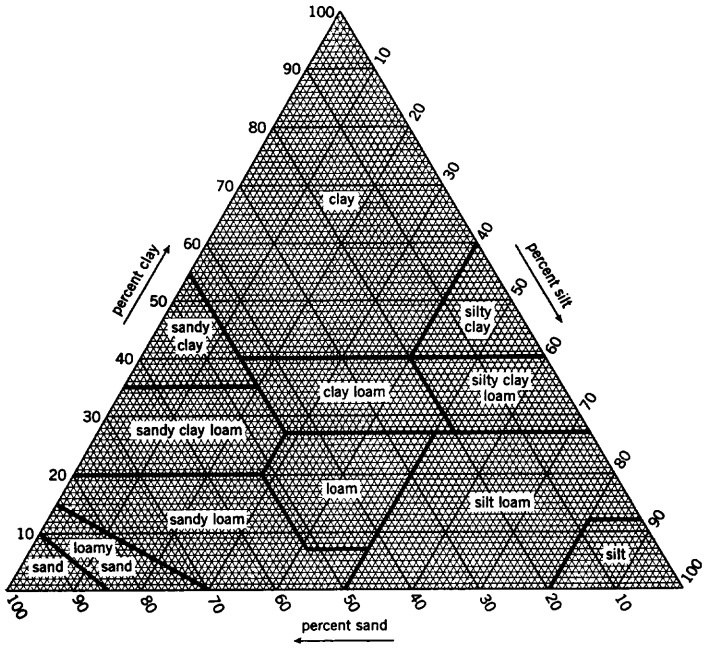


***Figure 15.*—Chart showing percentages of clay (below 0.002 mm.), silt (0.002 to 0.05 mm.), and sand (0.05 to 2.0 mm.) in the basic soil textural classes of the United States Department of Agriculture.**

Soils of the San Mateo Area

The large soil map at the back of this report shows the kind of soil at each place in the survey area. To understand these soils, it is helpful to learn some of the terms used in describing them. The first part of this section provides definitions of several of these terms. In the pages following the definitions, the soil series (groups of single soils that are basically alike in most respects except for the texture of the upper layer) and the soils in each of the series are described.

Soil Survey Methods and Definitions

Soil surveys are made to provide accurate soil maps for many uses; in particular for classifying, interpreting, applying, and extending agronomic information so as to maintain or increase agricultural production. It is impossible to conduct trials on every field. Trials are possible on only a few soils and fields, and a means must be found to extend such information from the localities of the trials to other places with reasonable assurance and confidence of success. Soil maps that show the kinds of soil at different locations provide such a means. Experimental information and experience of farmers can then be transferred from one area to another where soils are the same or similar.

Soil maps for different uses are made in varying degrees of detail. An area proposed for irrigation might be mapped in greater detail and on a larger scale than an area of dryland, range, or forest.

The preparation of a soil map takes place in several steps. The first step consists of examining the soils of the area in a number of places. Cuts made for highways or railroads afford an opportunity to study the profiles of some soils; in addition, pits are dug and auger borings are made. Each exposure reveals the profile of that soil. Most profiles consist of several layers that are called *horizons*. Each horizon, including the underlying parent material, is studied in detail; its properties are described by making note of the texture, color, structure, consistence, gravel or stone content, and other features if they can be observed. In addition, the reaction, lime content, and soluble salts or alkali are determined by various tests.

Drainage, both external and internal, and other features, such as slope or lay of the land, are also taken into consideration, and the vegetation is studied closely.

CLASSIFICATION.—The soils are classified on the basis of observed characteristics, with special emphasis on features that influence their suitability for growth of crops, grasses, and other plants. The three principal units of classification are the soil series, soil type, and soil phase.

Soil series.—A soil series is a group of soils having the same sequence and arrangement of horizons and developed from a particular parent material. Thus, the series includes soils having the same arrangement of horizons with similar thicknesses, color, structure, and consistence. Series are given geographic names selected from the localities where they were first identified.

Soil type.—Within a soil series, there may be one or more soil types, depending on textural variations of the surface horizon within the series. Denison clay loam for example, is a soil type. The types within a series have substantially similar properties throughout the profile.

Soil phase.—The soil phase is a subdivision of a soil type differing form the type in some feature potentially significant to use and management. Some of the features used for differentiating between phases within a type are slope, stoniness, degree of erosion, and degree of wetness. The following illustrates the subdivision of a series into types and the types, in turn, into phases:

Series:
  Pomponio.
Types:
  Pomponio clay loam.
  Pomponio loam.
Phases:
  Pomponio clay loam, sloping, eroded.
  Pomponio clay loam, moderately steep, eroded.
  Pomponio loam, sloping, eroded.
  Pomponio loam, moderately steep, eroded.
  Pomponio loam, steep, eroded.

In addition, there are two other mapping units of considerable importance—(a) the soil complex and (b) miscellaneous land types.

Soil complex.—A soil complex consists of two or more of the other principal units of classification that form such an involved pattern they cannot be separated. The Laughlin-Sweeney complex is an example of such a combination in this Area.

Miscellaneous land types.—Areas that have little or no true soil are not classified by types and series. Instead, they are identified by descriptive names. Coastal beaches and Rough broken land are examples of miscellaneous land types of importance in this Area.

* * *

552131—61——4

Since 1899, soil survey reports have been published by the United States Department of Agriculture in cooperation with the various State agricultural experiment stations and other agencies in some States. An important part of the cooperative soil survey consists of correlating soils in a nationwide system of soil classification. A soil series is given the same name wherever it is found. Farming experience and experimental data on soils of known characteristics can be applied to similar soils in other areas.

The system of soil classification has steadily been modified to keep up with new information about soils and their management. In the early surveys, soil series were broadly defined. New developments have sometimes revealed important differences among soils at first believed to be members of the same series. The original series have then been subdivided in order to define soils on which information about uses and responses can be applied with greater precision. Many of the soil maps made since about 1945 are more detailed and recognize more soil series than some of the older maps.

Descriptions of Soils

This section is provided for those who want detailed information about the soils. It describes the single soils, or mapping units, in the Area; that is, the areas on the detailed soil map that are bounded by lines and identified by a letter symbol. For more generalized information about soils, the reader can refer to the section, Soil Associations. The approximate acreage and proportionate extent of the soils are given in table 10, and a list of the soils mapped, along with the capability unit of each, is given in the back of this report.

TABLE 10.—*Approximate acreage and proportionate extent of the soils of the San Mateo Area*

Soil symbol	Soil	Acres	Percent	Soil symbol	Soil	Acres	Percent
Ad	Active dune land	316	0.2	ClC2	Colma loam, sloping, eroded	72	(1)
BaB2	Baywood sandy loam, gently sloping, eroded	62	(1)	ClD2	Colma loam, moderately steep, eroded	567	0.3
BaC2	Baywood sandy loam, sloping, eroded	158	.1	ClE2	Colma loam, steep, eroded	913	.5
BaD2	Baywood sandy loam, moderately steep, eroded	14	(1)	ClF2	Colma loam, very steep, eroded	600	.4
BcA	Botella clay loam, nearly level	217	.1	CoA	Coquille loam, nearly level, saline	250	.1
BcB	Botella clay loam, gently sloping	80	(1)	CsA	Corralitos sandy loam, nearly level	64	(1)
BcC2	Botella clay loam, sloping, eroded	86	.1	CsB	Corralitos sandy loam, gently sloping	181	.1
BeB	Botella loam, gently sloping	212	.1	CwB	Corralitos sandy loam, over gravel, gently sloping	20	(1)
BeC2	Botella loam, sloping, eroded	276	.2	CtA	Corralitos sandy loam, nearly level, imperfectly drained	195	.1
BdA	Botella loam, nearly level, imperfectly drained	52	(1)	CtB	Corralitos sandy loam, gently sloping, imperfectly drained	42	(1)
BdB	Botella loam, gently sloping, imperfectly drained	110	.1	CuA	Corralitos sandy loam, over gravel, nearly level, imperfectly drained	164	.1
BoC	Botella loam, sloping, seeped	151	.1	CyA	Corralitos sandy loam, over clay, nearly level, imperfectly drained	149	.1
BfB	Botella loam, nearly level and gently sloping, poorly drained variant	66	(1)	CrA	Corralitos loamy sand, nearly level, imperfectly drained	60	(1)
BuE	Butano loam, steep	878	.5	DcA	Denison clay loam, nearly level	802	.5
BuD	Butano loam, moderately steep	331	.2	DdA	Denison clay loam, nearly level, imperfectly drained	61	(1)
BuF	Butano loam, very steep	11,621	6.9	DmA	Denison loam, nearly level	352	.2
BsF	Butano shaly loam, very steep	447	.3	DmB	Denison loam, gently sloping	93	.1
CcE2	Cayucos clay loam, steep, eroded	1,529	.9	DmC	Denison loam, sloping	36	(1)
CcC2	Cayucos clay loam, sloping, eroded	102	.1	DeA	Denison coarse sandy loam, nearly level	50	(1)
CcD2	Cayucos clay loam, moderately steep, eroded	955	.6	DuA	Dublin clay, nearly level	107	.1
CcF2	Cayucos clay loam, very steep, eroded	490	.3	DuB	Dublin clay, gently sloping	316	.2
CcF3	Cayucos clay loam, steep and very steep, severely eroded	51	(1)	DuC2	Dublin clay, sloping, eroded	120	.1
CdC2	Cayucos clay loam, deep, sloping, eroded	72	(1)	DuD2	Dublin clay, moderately steep, eroded	42	(1)
CdD2	Cayucos clay loam, deep, moderately steep, eroded	13	(1)	DwA	Dublin clay, nearly level, imperfectly drained	234	.1
CaD2	Cayucos clay, moderately steep, eroded	96	.1	DwB	Dublin clay, gently sloping, imperfectly drained	74	(1)
CeF2	Cayucos stony clay loam, very steep, eroded	153	.1	EhC2	Elkhorn sandy loam, sloping, eroded	609	.4
Cf	Coastal beaches	634	.4	EhB	Elkhorn sandy loam, gently sloping	111	.1
CmF2	Colma sandy loam, very steep, eroded	619	.4	EhB2	Elkhorn sandy loam, gently sloping, eroded	202	.1
CmC2	Colma sandy loam, sloping, eroded	127	.1	EhD2	Elkhorn sandy loam, moderately steep, eroded	298	.2
CmD2	Colma sandy loam, moderately steep, eroded	385	.2	EhE3	Elkhorn sandy loam, moderately steep and steep, severely eroded	183	.1
CmE2	Colma sandy loam, steep, eroded	881	.5	EtB	Elkhorn sandy loam, thick surface, gently sloping	169	.1
CmF3	Colma sandy loam, steep and very steep, severely eroded	613	.4				

See footnote at end of table.

TABLE 10.—*Approximate acreage and proportionate extent of the soils of the San Mateo Area*—Continued

Soil symbol	Soil	Acres	Percent
EtC2	Elkhorn sandy loam, thick surface, sloping, eroded	197	0. 1
FcA	Farallone coarse sandy loam, nearly level	355	. 2
FcB	Farallone coarse sandy loam, gently sloping	147	. 1
FcC2	Farallone coarse sandy loam, sloping, eroded	146	. 1
FcD2	Farallone coarse sandy loam, moderately steep, eroded	71	(1)
FsB	Farallone coarse sandy loam, over coarse sands, gently sloping, seeped	187	. 1
FaA	Farallone loam, nearly level	121	. 1
FaB	Farallone loam, gently sloping	77	(1)
FyB	Farallone loamy coarse sand, gently sloping	69	(1)
FyC2	Farallone loamy coarse sand, sloping, eroded	157	. 1
GbF2	Gazos loam, very steep, eroded	5, 306	3. 1
GbC2	Gazos loam, sloping, eroded	132	. 1
GbD2	Gazos loam, moderately steep, eroded	542	. 3
GbE2	Gazos loam, steep, eroded	837	. 5
GbD3	Gazos loam, moderately steep, severely eroded	86	. 1
GdC2	Gazos loam, dark, sloping, eroded	20	(1)
GaD2	Gazos fine sandy loam, moderately steep, eroded	140	. 1
GaE2	Gazos fine sandy loam, steep, eroded	173	. 1
GlB	Gazos-Lobitos silt loams, gently sloping	45	(1)
GlC2	Gazos-Lobitos silt loams, sloping, eroded	287	. 2
GlD2	Gazos-Lobitos silt loams, moderately steep, eroded	357	. 2
GlF	Gazos-Lobitos silt loams, very steep	1, 513	. 9
GlE2	Gazos-Lobitos silt loams, steep, eroded	457	. 3
GsE2	Gazos and Lobitos stony loams, steep, eroded	220	. 1
GsF2	Gazos and Lobitos stony loams, very steep, eroded	1, 283	. 8
GoF3	Gazos and Lobitos soils, steep and very steep, severely eroded	1, 025	. 6
GcC2	Gazos (dark phase)-Calera loams, sloping, eroded	73	(1)
GcE2	Gazos (dark phase)-Calera loams, steep, eroded	138	. 1
GcF2	Gazos (dark phase)-Calera loams, very steep, eroded	654	. 4
GkE2	Gazos (dark phase)-Sweeney loams, steep, eroded	170	. 1
Gu	Gullied land (alluvial soil material)	396	. 2
Gv	Gullied land (Gazos-Lobitos soil material)	21	(1)
Gw	Gullied land (Tierra and Watsonville soil materials)	549	. 3
HyF	Hugo and Josephine sandy loams, very steep	14, 657	8. 7
HyF2	Hugo and Josephine sandy loams, very steep, eroded	6, 405	3. 8
HyE2	Hugo and Josephine sandy loams, steep, eroded	1, 852	1. 1
HyE	Hugo and Josephone sandy loams, steep	855	. 5
HyD2	Hugo and Josephine sandy loams, moderately steep, eroded	568	. 3
HyC2	Hugo and Josephine sandy loams, sloping, eroded	108	. 1
HzC	Hugo and Josephine sandy loams, very deep, sloping	77	(1)
HzD	Hugo and Josephine sandy loams, very deep, moderately steep	95	0. 1
HuC	Hugo and Josephine loams, sloping	171	. 1
HuD	Hugo and Josephine loams, moderately steep	473	. 3
HuD2	Hugo and Josephine loams, moderately steep, eroded	391	. 2
HuE	Hugo and Josephine loams, steep	1, 409	. 8
HuE2	Hugo and Josephine loams, steep, eroded	422	. 2
HuF	Hugo and Josephine loams, very steep	13, 209	7. 8
HvB	Hugo and Josephine loams, very deep, gently sloping	30	(1)
HvC	Hugo and Josephine loams, very deep, sloping	276	. 1
LaE2	Laughlin loam, steep, eroded	88	. 1
LaF2	Laughlin loam, very steep, eroded	87	. 1
LaD2	Laughlin loam, moderately steep, eroded	79	(1)
LaC2	Laughlin loam, sloping, eroded	66	(1)
LbC2	Laughlin-Sweeney loams, sloping, eroded	77	(1)
LbD2	Laughlin-Sweeney loams, moderately steep, eroded	306	. 2
LbE2	Laughlin-Sweeney loams, steep, eroded	774	. 5
LbF2	Laughlin-Sweeney loams, very steep, eroded	780	. 5
LlE2	Lobitos loam, steep, eroded	5, 197	3. 1
LlF2	Lobitos loam, very steep, eroded	3, 880	2. 3
LlD2	Lobitos loam, moderately steep, eroded	3, 422	2. 0
LlC2	Lobitos loam, sloping, eroded	165	. 1
LdD2	Lobitos loam, deep, moderately steep, eroded	83	(1)
LdC2	Lobitos loam, deep, sloping, eroded	220	. 1
LfC2	Lobitos fine sandy loam, sloping, eroded	117	. 1
LfD2	Lobitos fine sandy loam, moderately steep, eroded	148	. 1
LfE2	Lobitos fine sandy loam, steep, eroded	110	. 1
LmB	Lockwood loam, gently sloping	191	. 1
LmC2	Lockwood loam, sloping, eroded	193	. 1
LwB	Lockwood loam, gently sloping, seeped	262	. 2
LwC	Lockwood loam, sloping, seeped	48	(1)
LoA	Lockwood loam, nearly level, imperfectly drained	85	. 1
LsB	Lockwood shaly loam, gently sloping	180	. 1
LvB2	Lockwood loam, brown subsoil variant, gently sloping, eroded	180	. 1
LvC2	Lockwood loam, brown subsoil variant, sloping, eroded	109	. 1
LvD2	Lockwood loam, brown subsoil variant, moderately steep, eroded	29	(1)
LzF	Los Gatos loam, very steep	81	(1)
LyC2	Los Gatos clay loam, sloping, eroded	30	(1)
LyE2	Los Gatos clay loam, steep, eroded	27	(1)
MdF	Mindego clay loam, very steep	2, 932	1. 7
MdE	Mindego clay loam, steep	417	. 2
MgF	Mindego stony clay loam, very steep	1, 333	. 8
MmE2	Miramar coarse sandy loam, steep, eroded	1, 633	1. 0
MmC2	Miramar coarse sandy loam, sloping, eroded	179	. 1
MmD2	Miramar coarse sandy loam, moderately steep, eroded	693	. 4
MmE3	Miramar coarse sandy loam, steep, severely eroded	1, 093	. 6
MmF2	Miramar coarse sandy loam, very steep, eroded	6, 003	3. 6

See footnote at end of table.

TABLE 10.—*Approximate acreage and proportionate extent of the soils of the San Mateo Area*—Continued

Soil symbol	Soil	Acres	Percent
Ma	Mixed alluvial land	1,349	0.8
MoF2	Montara stony loam, steep and very steep, eroded	193	.1
PpD2	Pomponio loam, moderately steep, eroded	1,779	1.1
PpC2	Pomponio loam, sloping, eroded	492	.3
PpE2	Pomponio loam, steep, eroded	908	.5
PoC2	Pomponio clay loam, sloping, eroded	68	(1)
PoD2	Pomponio clay loam, moderately steep, eroded	178	.1
Rb	Rough broken land	9,800	5.8
SaF2	Santa Lucia loam, very steep, eroded	5,396	3.2
SaC2	Santa Lucia loam, sloping, eroded	454	.3
SaD2	Santa Lucia loam, moderately steep, eroded	2,127	1.3
SaE2	Santa Lucia loam, steep, eroded	3,298	2.0
SaF3	Santa Lucia loam, steep and very steep, severely eroded	346	.2
SbE2	Santa Lucia stony loam, steep, eroded	362	.2
SbF2	Santa Lucia stony loam, very steep, eroded	2,311	1.4
SbF3	Santa Lucia stony loam, steep and very steep, severely eroded	179	.1
ScF3	Santa Lucia stony loam, very shallow, steep and very steep, severely eroded	332	.2
ShF	Sheridan coarse sandy loam, very steep	1,091	.6
ShE	Sheridan coarse sandy loam, steep	129	.1
ShD	Sheridan coarse sandy loam, moderately steep	41	(1)
SkA	Soquel loam, nearly level	287	.2
SkB	Soquel loam, gently sloping	167	.1
SkC2	Soquel loam, sloping, eroded	46	(1)
SoA	Soquel loam, over clay, nearly level	177	.1
SrA	Soquel loam, over clay, nearly level, poorly drained	69	(1)
SsA	Soquel loam, over clay, nearly level, imperfectly drained	48	(1)
SmA	Soquel loam, nearly level, imperfectly drained	42	(1)
SpB	Soquel loam, gently sloping, poorly drained	24	(1)
Sd	Stabilized dune land	308	.2
SwD2	Sweeney clay loam, moderately steep, eroded	773	.5
SwC2	Sweeney clay loam, sloping, eroded	70	(1)
SwE2	Sweeney clay loam, steep, eroded	676	.4
SwF2	Sweeney clay loam, very steep, eroded	522	.3
SwF3	Sweeney clay loam, steep and very steep, severely eroded	99	.1
SxC2	Sweeney clay loam, deep, sloping, eroded	192	.1
SxD2	Sweeney clay loam, deep, moderately steep, eroded	239	.1
SzD2	Sweeney stony clay loam, moderately steep, eroded	243	.1
SzE2	Sweeney stony clay loam, steep, eroded	704	.4
SzF2	Sweeney stony clay loam, very steep, eroded	1,169	.7
StC	Sweeney clay, sloping	81	(1)
StD2	Sweeney clay, moderately steep, eroded	157	.1
SyC2	Sweeney loam, sloping, eroded	47	(1)
SyD2	Sweeney loam, moderately steep, eroded	173	.1
SyE2	Sweeney loam, steep, eroded	207	.1
SyF2	Sweeney loam, very steep, eroded	441	.3
Ta	Terrace escarpments	732	0.4
TeD2	Tierra loam, moderately steep, eroded	1,518	.9
TeB	Tierra loam, gently sloping	27	(1)
TeC2	Tierra loam, sloping, eroded	663	.4
TeE3	Tierra loam, steep, severely eroded	1,249	.7
TeE2	Tierra loam, steep, eroded	2,146	1.3
TeD3	Tierra loam, moderately steep, severely eroded	108	.1
TmC2	Tierra sandy loam, sloping, eroded	257	.2
TmD2	Tierra sandy loam, moderately steep, eroded	336	.2
TcC2	Tierra clay loam, sloping, eroded	82	(1)
TcD2	Tierra clay loam, moderately steep, eroded	110	.1
TsB	Tierra sandy loam, acid variant, gently sloping	532	.3
TsC2	Tierra sandy loam, acid variant, sloping, eroded	347	.2
TsD2	Tierra sandy loam, acid variant, moderately steep, eroded	56	(1)
TsE3	Tierra sandy loam, acid variant, steep, severely eroded	32	(1)
TuC2	Tunitas clay loam, sloping, eroded	203	.1
TuA	Tunitas clay loam, nearly level	53	(1)
TuB	Tunitas clay loam, gently sloping	152	.1
TuD2	Tunitas clay loam, moderately steep, eroded	97	.1
TwA	Tunitas clay loam, nearly level, imperfectly drained	140	.1
TwB	Tunitas clay loam, gently sloping, imperfectly drained	180	.1
TxA	Tunitas loam, nearly level	18	(1)
TxB	Tunitas loam, gently sloping	167	.1
TxC2	Tunitas loam, sloping, eroded	131	.1
WmC2	Watsonville loam, sloping, eroded	911	.5
WmB2	Watsonville loam, gently sloping, eroded	572	.3
WmD2	Watsonville loam, moderately steep, eroded	436	.3
WmA	Watsonville loam, nearly level	517	.3
WmB	Watsonville loam, gently sloping	71	(1)
WmC3	Watsonville loam, sloping, severely eroded	40	(1)
WmE3	Watsonville loam, moderately steep and steep, severely eroded	68	(1)
WnA	Watsonville loam, nearly level, poorly drained	35	(1)
WnB	Watsonville loam, gently sloping, poorly drained	24	(1)
WaA	Watsonville clay loam, nearly level	31	(1)
WaB	Watsonville clay loam, gently sloping	54	(1)
WaC2	Watsonville clay loam, sloping, eroded	36	(1)
WsC2	Watsonville sandy loam, sloping, eroded	719	.4
WsB2	Watsonville sandy loam, gently sloping, eroded	173	.1
WsB	Watsonville sandy loam, gently sloping	313	.2
WsD2	Watsonville sandy loam, moderately steep, eroded	346	.2
WtB2	Watsonville sandy loam, thick surface, gently sloping, eroded	92	.1
WoB	Watsonville loamy sand, gently sloping, overblown	134	.1
	Gravel pits	17	(1)
	Total	168,898	99.1

[1] Less than 0.1 percent. These soils total 0.9 percent.

Active dune land

Active dune land (Ad).—This miscellaneous land type consists of loose, shifting sand. It occurs in a number of small and large areas along the coast. The most extensive areas are in the vicinity of Ano Nuevo Point and Pigeon Point and near the mouth of Pescadero Creek. This land type has no agricultural value. Capability unit VIIIe–1.

Baywood series

The Baywood series consists of gently sloping to moderately steep, somewhat excessively drained soils formed from sandy alluvium blown from adjacent beaches. The vegetation in uncultivated areas is chiefly coyotebrush, bush lupine, and other shrubs and herbs common to the ocean front. The Baywood soils of this county are all on upland terraces in one area south of the mouth of Pescadero Creek. Coquille and Elkhorn soils are in the same general area. The average rainfall is 20 to 25 inches. The elevation ranges from 10 to 50 feet.

The surface soil is thick, gray, soft, weakly granular sandy loam. In eroded areas this layer is brown or dark grayish brown. The subsoil and substratum are lighter colored, soft, nearly massive sandy loam or loamy sand containing a few soft to hard, dark reddish-brown iron concretions. The soil profile is slightly acid throughout. It is underlain by finer textured marine sediments at a depth greater than 60 inches.

The Baywood soils are used for irrigated truck crops and pasture.

Baywood sandy loam, gently sloping, eroded (BaB2).—Slope of this soil ranges from 2 to 5 percent. In a few places, especially in road cuts, the old, underlying marine terrace may be seen. This layer is characteristically a compact, slowly permeable sandy clay. Water tends to flow laterally on top of it. In most places this sandy clay layer is too deep to affect the use of the soil. In one small area the soil is affected by seepage.

Runoff is typically very slow, but in some places the surface layer tends to seal and the soil does not absorb water so readily. The erosion hazard is slight. Permeability is rapid in the surface soil and very rapid in the subsoil. The effective depth of the root zone is very deep, the water-holding capacity is low, and the soil is droughty for shallow-rooted crops. The soil is easy to work. It is used principally for truck crops. Natural fertility is low, but, where fertilizer is used, fair to high yields are obtained. Capability unit IIs–4.

Baywood sandy loam, sloping, eroded (BaC2).—This soil is similar to Baywood sandy loam, gently sloping, eroded, but its slope ranges from 5 to 11 percent. Runoff is very slow to slow, and the erosion hazard is moderate. In one large area numerous gullies have formed.

This soil is used principally for truck crops and for irrigated pasture. Capability unit IIIe–4.

Baywood sandy loam, moderately steep, eroded (BaD2).—This soil is similar to Baywood sandy loam, gently sloping, eroded, but its slope ranges from 11 to 21 percent.

Runoff is slow, but the erosion hazard is high because of the slope, and erosion has been severe in places. The soil is fairly easy to work. It is used for truck crops and for dry-farmed crops, such as flax and grain. This soil is best suited to improved pasture and to other permanent vegetation. Capability unit IVe–3.

Botella series

The Botella series consists of nearly level to gently sloping, dark-colored, well-drained to imperfectly drained soils on older flood plains where there are deeply entrenched streams. The soils have formed mainly from material washed from sedimentary rocks. In some areas the material contains small amounts of sediments derived from basic igneous rocks. The vegetation is coyotebrush and an understory of grass. Along the stream channels, willows and other water-loving plants are common. The Botella soils occur throughout the Area in small alluvial valleys and on gently sloping benches, terraces, and fans. Most of them occur at elevations ranging from near sea level to a few hundred feet, although small areas occur in the mountains. Associated soils are mainly those of the Soquel, Gazos, Lobitos, and Dublin series. The annual rainfall is 20 to 30 inches.

The surface soil is thick, very dark gray, slightly acid, strongly granular loam, clay loam, or shaly loam. The subsoil contains more clay than the surface soil, is hard to very hard when dry, dark grayish brown, and slightly acid, and has subangular blocky structure. The parent material is mottled grayish-brown and gray, very hard, nearly massive, neutral clay loam.

In many places the Botella soils are in small stringers that are difficult to farm. Where they occur in large enough areas, they are used for hay, grain, flax, and some truck crops.

Botella clay loam, nearly level (BcA).—This well-drained soil occurs in some of the larger, nearly level valleys. The largest of these is near Half Moon Bay. Slope of this soil ranges from 0 to 3 percent but is generally less than 1 percent. Included are about 20 acres that have a loam surface layer. Runoff is very slow, and the erosion hazard is none or slight. Permeability is moderately slow. The effective depth of the root zone is very deep, the water-holding capacity is very high, and natural fertility is high. The soil is fairly easy to work.

Most of this soil is farmed intensively to truck crops (fig. 16). If the soils are fertilized, especially with nitrogen, yields are high. Care must be used in applying irrigation water to prevent waterlogging the soil. Capability unit I–1.

Botella clay loam, gently sloping (BcB).—This soil is similar to Botella clay loam, nearly level, except for slope.

Figure 16.—**Field of artichokes on Botella clay loam, nearly level.**

Its slope ranges from 3 to 7 percent. Runoff is slow and the erosion hazard is slight.

This soil occurs in a number of small areas and is used for truck crops, range, and dryfarming to grain and flax. Yields are generally high. Fertilizer, especially nitrogen, should be used for best results. Management practices needed include cross-slope farming. Capability unit IIe–1.

Botella clay loam, sloping, eroded (BcC2).—This soil occurs in a number of small areas, principally on the edges of small valleys or on small fans. The profile is similar to that of Botella clay loam, nearly level. Slope of this soil ranges from 7 to 16 percent. About half the areas are only slightly eroded. Runoff is slow to medium, and the erosion hazard is moderate. The soil is rather difficult to work.

The soil is used principally for dryfarming to grain and flax, and in some places for range. Intensive practices are needed to prevent soil losses when the soil is cultivated. Capability unit IIIe–1.

Botella loam, gently sloping (BeB).—This soil is similar to Botella clay loam, nearly level, except that the surface layer is loam and slope ranges from 3 to 7 percent.

Runoff is slow and the erosion hazard is slight. Permeability is moderate in the surface soil and moderately slow in the subsoil. The soil has a high water-holding capacity and is easy to work.

This soil is used for truck crops and pasture. Yields are fair to high, but nitrogen fertilizer is needed. Capability unit IIe–1.

Botella loam, sloping, eroded (BeC2).—Except for slope and a thinner surface layer because of erosion, this soil is similar to Botella loam, gently sloping. Slope ranges from 7 to 16 percent. A few steeper areas are included. Runoff is slow to medium, and there is a moderate erosion hazard. Workability is fairly easy.

This soil is mainly dry-farmed to flax, but some of it is used for range. When it is cultivated, intensive erosion-control measures should be used. Capability unit IIIe–1.

Botella loam, nearly level, imperfectly drained (BdA).—This soil is similar to Botella loam, gently sloping, except that its slope ranges from 0 to 3 percent. Also, because of an occasional high water table, there are a few, faint mottles in the lower subsoil.

Runoff is very slow. There is no hazard of erosion, although in some places deposition may occur from erosion of higher lying soils. Workability is fairly easy.

The soil is used for pasture, range, and, in some places, for growing truck crops. Natural fertility is high, and high yields can be expected. If the soil is cultivated intensively, nitrogen fertilizer should be used. Management practices should include improved drainage. Capability unit IIw–2.

Botella loam, gently sloping, imperfectly drained (BdB).—This soil is similar to Botella loam, nearly level, imperfectly drained, except for slope. Slope ranges from 3 to 7 percent. The soil is located in small alluvial bottoms and on colluvial toe slopes. There is a moisture problem caused by seepage from springs or by drainage from higher lying areas. Seeps occur on about half of the acreage. Runoff is slow and water collects in low spots. There is a slight erosion hazard.

This soil is used for dry-farmed grain crops, flax, and range. Drainage measures to intercept the excess water, and erosion-control measures, such as cross-slope cultivation, are needed. Capability unit IIw–2.

Botella loam, sloping, seeped (BoC).—This soil is similar to Botella loam, nearly level, imperfectly drained, except that its slope ranges from 7 to 16 percent and numerous springs and seeps from adjacent hills cause permanent wet spots. About one-third of it has gravel in the surface horizon. Runoff is slow to medium, and the erosion hazard is moderate. The soil is rather difficult to work.

This soil is used mainly for the production of dry-farmed crops, such as flax and grain. Some is used for range. When it is cultivated, intensive practices are needed to protect the soil from erosion. Capability unit IIIe–1.

Botella loam, nearly level and gently sloping, poorly drained variant (BfB).—This soil is similar to Botella loam, nearly level, imperfectly drained, but it is poorly drained and there are distinct mottles in the subsoil. It occurs in small valleys where disposal of seepage and drainage water is a problem. Slope of this soil ranges from 0 to 6 percent. Runoff is slow, and the erosion hazard is none or slight. Workability is rather difficult.

This soil is used for grazing. If drainage is provided, the soil can be used for cultivated crops. Fair yields may be expected. Capability unit IIIw–2.

Butano series

The Butano series consists of moderately steep to very steep, light-colored, well-drained to somewhat excessively drained upland soils that were formed from siliceous shales of the Monterey formation. The native vegetation was Douglas-fir and redwood, with some madrone, oak, ceanothus, poison-oak, and scattered perennial grasses. The Butano soils are extensive in the mountains in the southern part of the Area at elevations above 600 feet. They are associated chiefly with Hugo and Josephine soils. The annual rainfall ranges from 30 to 50 inches.

The surface soil is thin, light brownish-gray, very hard when dry, granular loam or shaly loam. There is a gradual increase in clay content from the surface downward to the parent rock, which is fractured in the upper portion. The surface soil is medium acid, and the subsoil is very strongly acid. There are fragments of hard, weathered shale throughout the profile in many places.

Butano soils are used almost exclusively for forestry, recreation, and watersheds. A few cutover areas are grazed.

Butano loam, steep (BuE).—The slope of this soil ranges from 30 to 45 percent. The soil is 36 to 60 inches deep to the parent rock.

Runoff is medium to rapid, and the erosion hazard is moderate to high. Permeability is moderate. The effective depth of rooting is deep. The soil has good water-holding capacity. Natural fertility is moderate, but the soil is difficult to work and is used only for forestry. Capability unit VIe–6.

Butano loam, moderately steep (BuD).—This soil occupies ridgetop or bench positions in otherwise steep topography. Except for slope, which in general ranges

from 16 to 30 percent, and about 50 acres on ridgetops as shallow as 20 inches, the soil is similar to Butano loam, steep. A few areas of more gentle slopes are included. Because of past logging operations, about 100 acres are eroded.

Runoff is medium, and the erosion hazard is slight to moderate. Workability is rather difficult.

The soil is used principally for forestry, for which it is well suited. A few logged-over areas are used for grazing. Capability unit IVe–6.

Butano loam, very steep (BuF).—This is the most extensive of the Butano soils. Except for slope, which is 45 percent or more, it is similar to Butano loam, steep. In a few places the soil is as shallow as 20 inches over the shale. These shallower areas are on ridgetops or logged areas that have eroded.

Drainage is somewhat excessive. Runoff is very rapid and the erosion hazard is high. The water-holding capacity is low to good, and the effective depth of rooting is moderately deep to deep. This soil is used for forestry. Capability unit VIIe–6.

Butano shaly loam, very steep (BsF).—This soil occurs on slopes of 45 percent or more. Numerous angular chips of the siliceous shale parent material are scattered throughout the soil. Average depth to bedrock is 20 inches, but in places the soil is as deep as 60 inches. Drainage is somewhat excessive. Runoff is very rapid, and the erosion hazard is moderate to high. The water-holding capacity is low to good. The effective depth of rooting is moderately deep to deep. The soil is used for watersheds and for forestry. Capability unit VIIe–6.

Cayucos series

The Cayucos series consists of sloping to very steep, dark-colored upland soils that were formed from noncalcareous shales and fine-grained sandstones. Drainage is good to somewhat excessive. The elevation ranges from 200 to 1,500 feet, and rainfall ranges from 20 to 30 inches. The vegetation is chiefly annual grasses and herbs, with a few oaks in places.

The surface soil is very dark gray, subangular blocky to blocky clay loam or clay. Some cracking into finer blocks and granules occurs in the immediate surface soil during the long dry season. The content of organic matter is moderate, and reaction ranges from slightly to medium acid.

The subsoil is clay, similar in color and structure to the surface soil but lower in organic-matter content. The reaction is similar to or slightly less acid than that of the surface soil.

The parent material is light olive-brown silty clay loam that contains numerous fragments of parent rock. The parent rock is light-gray, fractured shale and fine-grained sandstone. Typically, the depth to bedrock ranges from 20 to 36 inches, but the extreme range is from 10 to 60 inches. Differences in consolidation of the parent rock presumably are largely responsible for differences in depth of soil.

The Cayucos soils are largely in grazing use for cattle and sheep. The more gently sloping areas are often used for small grain, small grain hay, or flax.

Cayucos clay loam, steep, eroded (CcE2).—This is the most extensive soil in the Cayucos series. Slope ranges from 31 to 45 percent. Depth of soil over the shale or sandstone ranges from 10 to 36 inches, averaging about 20 inches. Included with this soil are about 50 acres in which the surface soil is clay, and about 30 acres of stony clay loam. About half of this soil has a few gullies and landslips.

Drainage is good to somewhat excessive, and surface runoff is medium to rapid. Permeability is slow when the soil is moist and the cracks are swollen shut. The erosion hazard is moderate to high.

This soil is largely in grazing use, as cultivation is difficult on the steep slopes. Capability unit VIe–5.

Cayucos clay loam, sloping, eroded (CcC2).—This soil is similar to Cayucos clay loam, steep, eroded, except for more gentle slopes and greater average depth to bedrock. Slope ranges from 7 to 16 percent, and depth of soil ranges from 20 to 36 inches. Several areas with slopes more gentle than 7 percent are included.

Drainage is good, and surface runoff is slow to medium. The erosion hazard is slight to moderate.

This soil is used for small grain, grain hay, and flax, and some tracts are used for grazing. Capability unit IIIe–1.

Cayucos clay loam, moderately steep, eroded (CcD2).—This soil is similar to Cayucos clay loam, steep, eroded, except for more gentle slopes and slightly greater average depth to bedrock. Slope ranges from 16 to 30 percent. Depth of soil ranges from 20 to 36 inches. There are a few gullies and landslips. Drainage is good and surface runoff is medium. The erosion hazard is moderate.

This soil is used for small grain, small grain hay, and flax and for grazing of dairy and beef cattle. Capability unit IVe–5.

Cayucos clay loam, very steep, eroded (CcF2).—This soil is similar to Cayucos clay loam, steep, eroded, except for stronger slope and slightly shallower average depth to bedrock. Its slope is stronger than 45 percent, and depth of soil ranges from 10 to 36 inches.

Drainage is somewhat excessive and surface runoff is rapid. The erosion hazard is high.

Because of its very steep slopes, this soil is used exclusively for grazing sheep and cattle. Capability unit VIIe–5.

Cayucos clay loam, steep and very steep, severely eroded (CcF3).—This soil is similar to Cayucos clay loam, steep, eroded, except that it is shallower, erosion has been severe, and slope ranges from 21 to more than 45 percent. Runoff is rapid or very rapid, the erosion hazard is high or very high, and gullies are numerous. The effective depth of root penetration is shallow. The soil has a very low water-holding capacity and is low in fertility. It is used only for grazing. Capability unit VIIe–5.

Cayucos clay loam, deep, sloping, eroded (CdC2).—This soil is similar to Cayucos clay loam, steep, eroded, except that it is deeper and slope ranges from 7 to 16 percent. A few areas are affected by seeps and springs. The effective depth of root penetration is moderately deep, and the water-holding capacity is good. Runoff is medium and the erosion hazard is moderate. The soil is rather difficult to work. It is used for grain and flax, and for range. Capability unit IIIe–1.

Cayucos clay loam, deep, moderately steep, eroded (CdD2).—This soil is similar to Cayucos clay loam, moderately steep, eroded, except for a greater depth to bedrock.

Depth of soil is 36 to 60 inches in most places, although in a small acreage it ranges from 20 to 36 inches. The slope of this soil ranges from 16 to 30 percent.

Drainage is good and surface runoff is medium. The erosion hazard is moderate.

This soil is used mostly for grazing. It could also be used for small grain, grain hay, or flax. Capability unit IVe–5.

Cayucos clay, moderately steep, eroded (CaD2).—Except for a clay surface texture, this soil is similar to Cayucos clay loam, moderately steep, eroded. Slope ranges from 16 to 30 percent. Soil depth ranges from 20 to 36 inches with a small acreage greater than 36 inches deep included.

Drainage is good and surface runoff is medium. The erosion hazard is moderate.

This soil is used principally for grazing. It could also be used for grain, grain hay, or flax. Capability unit IVe–5.

Cayucos stony clay loam, very steep, eroded (CeF2).—This soil is similar to Cayucos clay loam, very steep, eroded, except for the presence of stone and rock outcrops. Slope is 45 percent or steeper, and depth of soil ranges from 10 to 36 inches.

Drainage is somewhat excessive and surface runoff is rapid. There is a high erosion hazard.

This soil is used only for grazing. Capability unit VIIe–5.

Coastal beaches

Coastal beaches (Cf).—This miscellaneous land type consists of narrow, sandy beaches that are covered or partly covered by waves during high tide and exposed during low tide. Along parts of the coast, bluffs 10 to 50 feet in height are back of the narrow beaches or rise abruptly from the sea. The beaches have no agricultural value but are used for recreation. Capability unit VIIIe–1.

Colma series

The Colma series consists of sloping to very steep, moderately coarse textured to medium-textured, well-drained soils that were formed in weakly consolidated marine sediments. The vegetation is chiefly coyotebrush and annual grasses. The soils are extensive on the first rolling terrace east of the coastline at elevations of from about 50 to 600 feet. They are associated with Tierra, Gazos, Lobitos, Botella, Corralitos, and Soquel soils. The average rainfall is 25 to 30 inches.

The surface soil is very dark gray, slightly acid, soft to slightly hard, granular sandy loam or loam. The subsoil is slightly finer textured. It is light yellowish brown or brown, medium acid, and slightly hard when dry, and it has subangular blocky structure. Weakly consolidated, light yellowish-brown marine sediments of fine sandy loam underlie the subsoil at variable depths.

Some areas of Colma soils are used for growing flax, grain, or hay. These areas may also be used as range. Most of the Colma soils, however, are too steep for cultivation, and their best use is for watersheds.

Colma sandy loam, very steep, eroded (CmF2).—This soil is only 10 to 20 inches deep over weakly consolidated marine sediments. The subsoil is not so distinct as the subsoil of less steep Colma soils, and the slope is 41 percent or steeper, runoff is very rapid, and the erosion hazard is very high. The permeability of the surface soil is rapid; subsoil permeability is moderate. The effective rooting depth is shallow. The water-holding capacity is very low, and natural fertility is low. Workability is difficult.

This soil is used primarily for grazing. Part of it is idle because of the heavy cover of brush. Yields of forage are fair to low. Capability unit VIIe–3.

Colma sandy loam, sloping, eroded (CmC2).—This soil is similar to Colma sandy loam, very steep, eroded, except that slope ranges from 5 to 11 percent and the soil is 20 to 36 inches deep over the sandy, weakly consolidated sediments. The soil occurs principally on ridgetops. Surface runoff is slow to medium, and the erosion hazard is slight to moderate. The soil tends to crust on drying. The effective depth of rooting is moderately deep, and the water-holding capacity is low. The soil is easy to work.

This soil is used for the production of flax, oats, and barley. Some is grazed. Only low to fair yields may be expected. Erosion-control measures, including cross-slope cultivation, diversion ditches, and mulch tillage, are needed to protect this soil during the winter months (fig. 17). Capability unit IIIe–3.

Colma sandy loam, moderately steep, eroded (CmD2).—This soil is similar to Colma sandy loam, very steep, eroded, except that slope ranges from 11 to 21 percent, and the weakly consolidated marine sediments are 10 to 36 inches below the surface. In about two-thirds of the acreage, the soil is 20 to 36 inches deep. About one-fifth of the acreage is gullied, and about 30 acres are affected by wet spots caused by springs and seepage from higher areas.

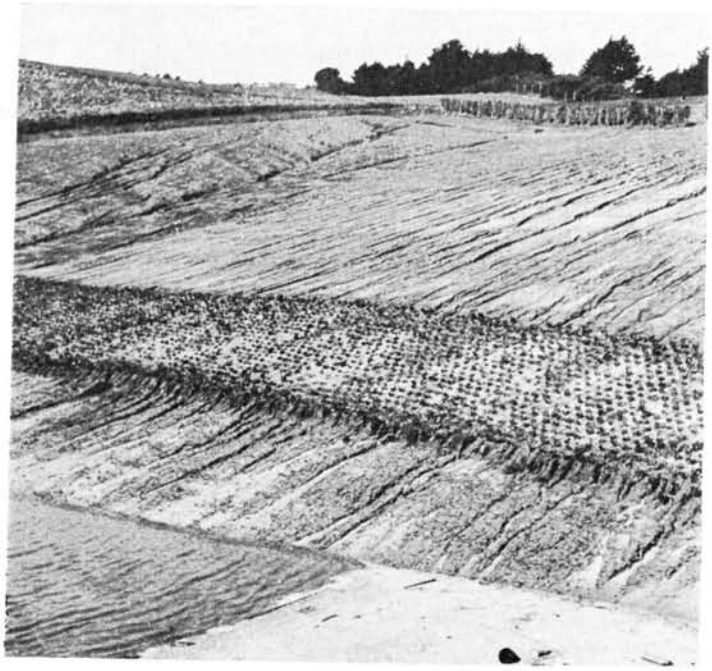


Figure 17.—**Colma sandy loam, sloping, eroded, needs to be protected from erosion during the winter months.**

Runoff is medium and the erosion hazard is moderate. The water-holding capacity is low, and the effective depth of rooting is shallow to moderately deep. Workability is fairly easy.

The soil is used for growing flax, grain hay, and some pasture. In the past it was used to a large extent for growing early peas for market. The fertility level has been reduced considerably; yields are low to fair. This soil should be in protective vegetation most of the time. Capability unit IVe–3.

Colma sandy loam, steep, eroded (CmE2).—This soil is similar to Colma sandy loam, very steep, eroded, except that slope ranges from 21 to 41 percent, and depth to the weakly consolidated marine sediments ranges from 10 to 36 inches. Nearly 75 percent of the acreage is gullied; some of the gullies are very deep. Runoff is rapid and the erosion hazard is high. The water-holding capacity is low, and the effective depth of rooting is shallow to moderately deep. Workability is rather difficult.

The soil is used mostly for grazing, although in the past much of it was cultivated. Because of the slope and risk of erosion, it is not suitable for cultivation and is best suited to range. Capability unit VIe–3.

Colma sandy loam, steep and very steep, severely eroded (CmF3).—Erosion has removed nearly all of the original surface soil, but this soil is otherwise similar to Colma sandy loam, very steep, eroded. In most places the subsoil is now at or near the surface, and the color in these areas is accordingly lighter and browner than in the less eroded areas. Slope of the soil is 21 percent and steeper, and the depth of the soil over the weakly consolidated sandy sediments ranges from 0 to 20 inches. Deep gullies, which are diffcult or impossible for equipment or cattle to cross, are common. Much of this soil has been farmed in the past to flax, grain, or early peas. Past cultural practices have permitted the severe erosion.

This soil is suitable only for a limited amount of grazing. Grazing should be carefully controlled to prevent further losses of soil. Capability unit VIIe–3.

Colma loam, sloping, eroded (ClC2).—This soil is mainly on ridgetops and on sloping benches. It is similar to Colma sandy loam, very steep, eroded, except that the surface layer is loam, slope ranges from 5 to 11 percent, and depth to the weakly consolidated marine sediments is 20 to 60 inches.

Runoff is slow to medium, and the erosion hazard is slight to moderate. Permeability is moderate. The effective depth of rooting is moderately deep to deep, and the water-holding capacity is good. The soil is fairly easy to work.

Most of this soil is cultivated and used for growing flax, grain, and hay. Part is used for grazing. When the soil is cultivated continuously, only fair to low yields may be expected. If the soil is cultivated, erosion-control practices should be used. Capability unit IIIe–3.

Colma loam, moderately steep, eroded (ClD2).—This soil is similar to Colma sandy loam, very steep, eroded, except that the surface soil is loam, slope ranges from 11 to 21 percent, and weakly consolidated marine sediments are at a depth of 10 to 36 inches. The average depth is 20 inches. The soil occurs mainly on ridgetops and on sidehill benches. There are a few gullies in about 25 percent of the acreage. Runoff is medium and the erosion hazard is moderate. The water-holding capacity is low to good, and effective depth of root penetration is shallow to moderately deep. The soil is moderately permeable and is fairly easy to work.

This soil is used for growing flax, oats, and barley; some of it is grazed. Because of the intensive past use, fertility is low and only fair to low yields may be expected. This soil should not be cultivated continuously and is best maintained in permanent cover. When it is cultivated, intensive conservation practices should be applied, including cross-slope farming, diversions, and mulch tillage. Capability unit IVe–3.

Colma loam, steep, eroded (ClE2).—This soil, which occurs primarily on sidehills, is similar to Colma sandy loam, very steep, eroded, except that the surface soil is loam, slope ranges from 21 to 40 percent, and depth to weakly consolidated marine sediments ranges from 10 to 36 inches. The effects of erosion vary from place to place depending on past cultivation; many areas are gullied, and there are few areas that are only slightly eroded. Permeability is moderate, and the effective depth of rooting is shallow to moderately deep. The water-holding capacity is low to good. The soil is rather difficult to work.

Most of this soil is used for grazing, but a few areas are cultivated to flax and grain. This soil is not suited to cultivation but should be maintained under a cover of grass. It is well suited to improvement as range. Because of favorable rainfall and temperature, improved introduced species of grasses and legumes do well. Capability unit VIe–3.

Colma loam, very steep, eroded (ClF2).—This soil occupies very steep sidehills, and much of it is still covered by brush. It is similar to Colma sandy loam, very steep, eroded, except for the texture of the surface layer. Depth to weakly consolidated marine sediments ranges from 10 to 36 inches. Moderate erosion has occurred in most places, and in about one-half the acreage there are a few gullies.

Runoff is very rapid, and the erosion hazard is very high. The water-holding capacity is very low to low. The effective depth of rooting is shallow to moderately deep.

Where the soil has been cleared of brush, it is used for grazing. Because of slope, intensive range conservation practices should be applied. Capability unit VIIe–3.

Coquille series

The Coquille series consists of nearly level, very poorly drained marshland soils that were developed in alluvium from mixed sources. Only one soil occurs in the Area. It is just west of Pescadero, at or near sea level. It is associated with Baywood, Tierra, Corralitos, and Soquel soils. The vegetation is mostly pickleweeds, reeds, and herbaceous plants. The annual rainfall is 20 to 25 inches.

The surface soil is gray or grayish-brown, soft, weakly granular loam that contains large quantities of fibrous organic matter, especially in the uppermost 2 inches. The upper part of the surface soil is strongly acid; the lower part is slightly acid and is mottled with yellow and red. In places the surface soil consists of several feet of peat stratified with silt. In the upstream portion of the area, there is as much as 20 inches of recently depos-

ited silt on the surface. The subsoil is light gray or light brownish gray and is strongly mottled, massive, and stratified. It ranges in texture from sandy loam to clay loam. The water table is within 18 inches of the surface most of the time.

The Coquille soil is used primarily for grazing. Yields of forage are low. A few areas have been drained and are used for barley and some truck crops.

Coquille loam, nearly level, saline (CoA).—This is the only soil of the Coquille series mapped in the Area. Slope ranges from 0 to 1 percent. This soil is affected by tides, and in most places it is moderately saline.

The effective depth of root penetration is shallow. Permeability is moderate in the surface soil and moderately slow in the subsoil. Runoff is ponded or very slow, and the water-holding capacity is high. There is no hazard of erosion. The soil is moderate in fertility and is difficult to work. At present it has little agricultural use, although some is being grazed and other areas are being drained. Drainage and reclamation are needed to make this a productive soil. Capability unit IIIw–2.

Corralitos series

The Corralitos series consists of nearly level to gently sloping, well-drained to imperfectly drained soils on flood plains or fans near streams. They have been formed in mixed alluvium that came from sedimentary rocks. The vegetation is chiefly grasses, oaks, and brush. Willow and birch grow along the banks of streams. The Corralitos soils are mainly near the outlets of major streams near San Gregorio and Pescadero at elevations ranging from sea level to about 100 feet. They are associated principally with Soquel, Dublin, and Tunitas soils. The average annual rainfall is 20 to 40 inches.

The surface soil is grayish-brown sandy loam or loamy sand that is slightly hard when dry and weakly granular. The subsoil consists of speckled brown, black, and white stratified layers of loose, massive sand or loamy sand, which in places is weakly mottled. The soil is slightly acid throughout. In some places the substratum is gravel, coarse sand, or clay. Occasionally, fresh layers of alluvium are deposited on the surface by overflowing streams.

Corralitos soils are important agriculturally. Their main use is for irrigated truck crops. A few areas are in irrigated pasture.

Corralitos sandy loam, nearly level (CsA).—This very deep soil is not extensive, but much of it is used for crops. Slope ranges from 0 to 1 percent. Runoff is very slow, and the erosion hazard is none or slight. Permeability is rapid in the surface soil and very rapid in the subsoil. The effective depth of root penetration is very deep. The water-holding capacity is low, and natural fertility is low. The soil is easy to work and is cultivated intensively. It needs fertilizer, especially nitrogen. Capability unit IIs–4.

Corralitos sandy loam, gently sloping (CsB).—This soil is similar to Corralitos sandy loam, nearly level, except that the slope is steeper, ranging mostly from 2 to 5 percent. In a few areas the slope is steeper than 6 percent. In about 15 acres the surface layer is loam. Runoff is very slow to slow, and the erosion hazard is slight.

This soil is cultivated intensively to truck crops; some is used for pasture. Fertilization, especially with nitrogen, is needed. Yields are fair to high. Capability unit IIs–4.

Corralitos sandy loam, over gravel, gently sloping (CwB).—This soil is similar to Corralitos sandy loam, gently sloping, except that layers of gravel and coarse sand are present at depths of 20 to 36 inches. In part of the acreage, the surface soil is loam.

Permeability is rapid above the layers of sand and gravel and very rapid in those layers. The effective depth of root penetration is moderately deep, and the water-holding capacity is low to very low.

This soil is cultivated and is suitable for growing truck crops and irrigated pasture. If it is fertilized, fair to high yields may be expected. Capability unit IIs–4.

Corralitos sandy loam, nearly level, imperfectly drained (CtA).—This soil occurs along streams near Pescadero. It is similar to Corralitos sandy loam, nearly level, except that it is imperfectly drained. Most areas have a surface layer of sandy loam, but in about 20 acres the surface layer is loam. During periods of high streamflow, some deposition may occur.

This soil is used for truck crops and pasture. If the soil is used intensively, fertilization is needed. Yields are fair to high. Because of position, drainage is a problem on this soil. Provision should be made for disposal of excess water. Capability unit IIw–2.

Corralitos sandy loam, gently sloping, imperfectly drained (CtB).—This soil is similar to Corralitos sandy loam, nearly level, imperfectly drained, except that slope ranges from 2 to 5 percent. Runoff is very slow to slow, and the erosion hazard is slight. Streambank cutting is a problem in places.

This soil is used intensively for growing truck crops. Fertilization, particularly with nitrogen, is needed. Fair to high yields may be expected. Capability unit IIw–2.

Corralitos sandy loam, over gravel, nearly level, imperfectly drained (CuA).—This soil is similar to Corralitos sandy loam, nearly level, imperfectly drained, except that it is underlain by gravel or coarse sand at a depth of 20 to 36 inches. In places the surface soil is loam.

The effective depth of root penetration is moderately deep. Permeability in the gravel is very rapid, and the water-holding capacity of the soil is low to very low. The erosion hazard is slight, except for streambank cutting. When streams are high during the winter, deposition often occurs.

This soil is suitable for most truck crops commonly grown in the area and for pasture. Careful management is needed because of the low to very low water-holding capacity. Fertility is low. If the soil is used intensively, fertilizer, particularly nitrogen, is needed. Capability unit IIs–4.

Corralitos sandy loam, over clay, nearly level, imperfectly drained (CyA).—This soil is similar to Corralitos sandy loam, nearly level, imperfectly drained, except that it is underlain at a depth of 10 to 36 inches by clay over which the more recent Corralitos sandy loam material has been deposited. Slope ranges from 0 to 1 percent. Water disposal is a problem on this soil; the water table is within 5 feet of the surface much of the time, and it often affects crops and management practices.

Permeability in the clay is slow. The effective depth of root penetration is shallow to moderately deep. There is a slight erosion hazard and also some risk of streambank cutting. The soil is fairly easy to work. If it is managed properly to control the water table and to overcome the surface droughtiness, fair to high yields of truck crops can be expected. Capability unit IIw–2.

Corralitos loamy sand, nearly level, imperfectly drained (CrA).—This soil is similar to Corralitos sandy loam, nearly level, imperfectly drained, except that the surface soil is loamy sand. Stratified lenses of material of various textures are common in the subsoil and substratum. The soil is adjacent to streams, and the lower parts of the profile are often wet. The larger areas of this soil are in the vicinity of Pescadero.

The soil is very rapidly permeable, but, because of position, disposal of excess water is a problem. Flooding sometimes occurs during winter. The water-holding capacity and fertility are low. Except for occasional streambank cutting, the erosion hazard is slight. Deposition frequently occurs during periods of high streamflow.

The soil is suitable for truck crops. Some large areas have a cover of willows and other water-loving plants. Capability unit IIs–4.

Denison series

The Denison series consists of nearly level to sloping, dark-colored, moderately well drained to imperfectly drained soils on low terraces. The soils have formed under grass vegetation from granitic alluvium. They occur along the coast north of Half Moon Bay at elevations ranging from about 10 to 50 feet. They are associated with the Farallone, Miramar, and Elkhorn soils. The annual rainfall is 20 to 30 inches.

The surface soil, which is black and medium acid or slightly acid, has a wide range in texture that includes coarse sandy loam, loam, and clay loam. The subsoil is also black, but in many places it is mottled in the lower part. The subsoil is neutral to slightly acid, heavy sandy clay loam or clay that is extremely hard when dry and has a strong, prismatic structure.

Most of the Denison soils are used for growing brussels sprouts, artichokes, cabbage, and flowers. Small grains and flax also are grown, and in a few places the soils are used for irrigated pasture.

Denison clay loam, nearly level (DcA).—This is the most extensive soil of the series. Slope ranges from 0 to 2 percent. Runoff is very slow, and the erosion hazard is none or slight. The water-holding capacity is very high. Permeability in the surface layer is moderately slow, and in the deep layers it is slow. Workability is rather difficult. The effective depth of root penetration is deep, and the soil has high fertility. A profile is shown in figure 18.

This soil is farmed intensively to truck crops. High yields may be expected; however, fertilizer, including nitrogen, is needed. Good soil management and careful irrigation are needed to maintain high yields. Capability unit IIs–3.

Denison clay loam, nearly level, imperfectly drained (DdA).—This soil is similar to Denison clay loam, nearly level, except that it is located in depressions where there is occasionally a high water table. The disposal of water is a problem.

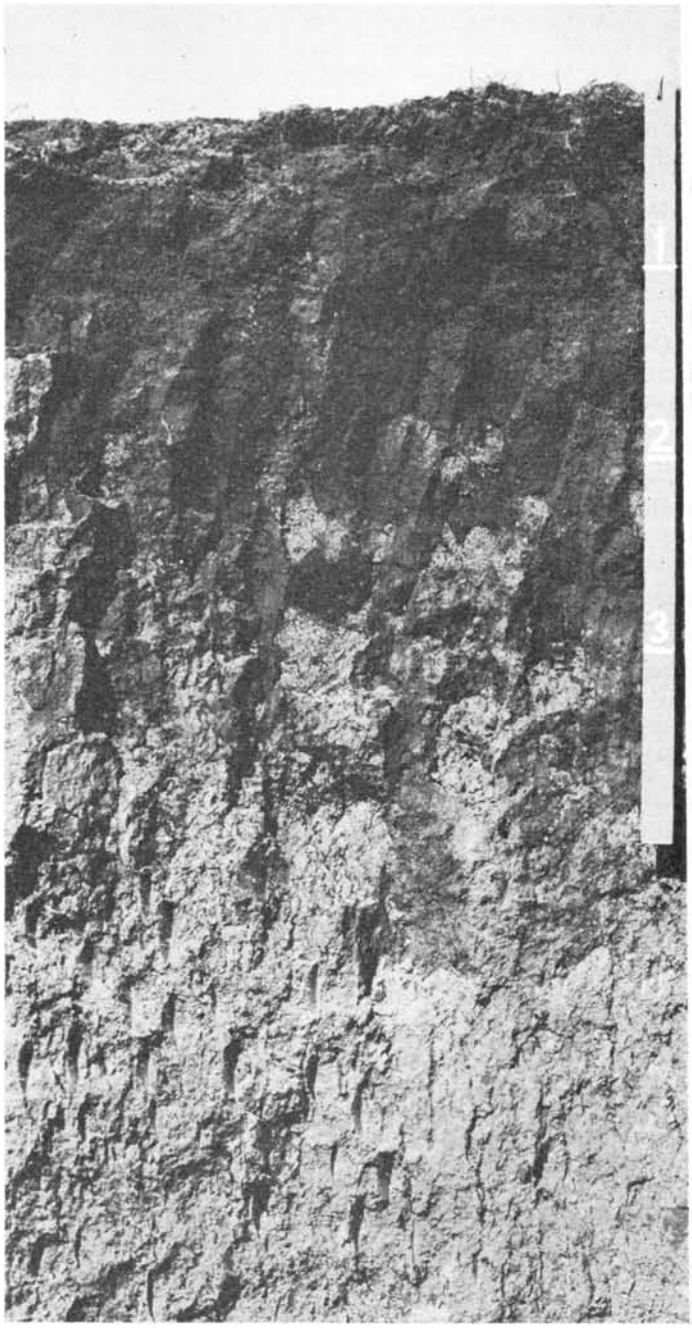


Figure 18—**Profile of Denison clay loam.**

Most of this soil is used for growing truck crops. Because of wetness, there are some losses of crops, such as brussels sprouts, which remain in the fields during the wet months. Capability unit IIw–2.

Denison loam, nearly level (DmA).—This soil is similar to Denison clay loam, nearly level, except that the uppermost 3 to 30 inches is loam. As in Denison coarse sandy loam, nearly level, this soil has had some deposition of coarser materials from higher areas. The deposits are not so thick, however, and some of the coarse material has been incorporated with the original surface layer.

Permeability is moderate in the surface soil and moderately slow to slow in the subsoil. The soil has a high

water-holding capacity and is easy to work.

This soil is used for growing truck crops and flowers and for pasture. High yields may be expected. Under intensive cultivation, fertilizer, including nitrogen, should be used. Careful irrigation in addition to general good soil management should be practiced. Capability unit IIs–3.

Denison loam, gently sloping (DmB).—This soil is similar to Denison loam, nearly level, except that the slope ranges from 2 to 6 percent, and there is a slight erosion hazard. Runoff is very slow to slow. Capability unit IIe–1.

Denison loam, sloping (DmC).—This soil is similar to Denison loam, nearly level, except that the slope ranges from 6 to 15 percent. Runoff is slow to medium, and there is a slight to moderate erosion hazard. The soil is fairly easy to work. It is used for truck crops. Capability unit IIIe–1.

Denison coarse sandy loam, nearly level (DeA).—This soil is of small extent and occurs in many very small areas. The surface layer of coarse sandy loam ranges in thickness from a few inches to several feet. Coarse material, probably washed from Farallone sandy loams, has been deposited over the original surface. Slope ranges from 0 to 1 percent.

Permeability is moderately rapid in the surface soil and moderately slow in the subsoil. The water-holding capacity is high. The surface soil, however, is likely to be somewhat droughty. The infiltration rate is good, and the soil is easy to work. Deposition of coarse material from higher lying areas is a problem.

This soil is used for truck crops and flowers. Fair to high yields of crops may be expected under good management. Fertilizer, including nitrogen, is needed. Because of the droughtiness of the surface soil and moderately slow permeability in the subsoil, careful irrigation must be practiced. Capability unit IIs–3.

Dublin series

The Dublin series consists of nearly level to sloping, moderately well drained to imperfectly drained, dark-colored clay soils on alluvial fans or flood plains. The soils were formed in alluvium that came from sedimentary rocks and from Hugo, Gazos, Lobitos, Santa Lucia, and Laughlin soils. The vegetation is mostly grasses, but a few willows border the streams. Large tracts of Dublin soils are near Pescadero, but these soils are scattered throughout the Area at elevations of about 25 to 150 feet. They are associated with Corralitos, Soquel, Tunitas, Gazos, Lobitos, and Cayucos soils. The annual rainfall is about 25 inches.

The surface soil is thick, very dark gray, mildly alkaline clay. It is massive and firm when moist, but it crumbles, on thorough drying, to very hard, fine and medium, subangular blocks. The subsoil, to a depth of 3 or 4 feet, is similar in color, slightly acid, and extremely hard when dry. It is massive when moist, but cracks widely, upon drying, to strong blocks, which continue to break up into smaller blocks upon further drying. The parent material is massive, very hard to extremely hard, moderately alkaline, noncalcareous clay loam that is many feet thick.

The Dublin soils are used for irrigated truck crops and pasture, dryfarming, and range.

Dublin clay, nearly level (DuA).—This moderately well drained soil has slope that ranges from 0 to 3 percent. The soil is rather difficult to work and can be cultivated only within a narrow range of moisture content. It puddles if cultivated when too wet and is very hard when dry. Runoff is very slow, and the erosion hazard is none to slight. Permeability is slow in both the surface soil and subsoil. The effective depth of root penetration is deep, and the water-holding capacity is very high.

The soil is used for irrigated truck crops and pasture; some of it is dryfarmed. The soil is high in fertility, but under intensive use it must be fertilized, especially with nitrogen. High yields can be expected under good management. Proper irrigation is necessary to prevent waterlogging the soil. Capability unit IIw–2.

Dublin clay, gently sloping (DuB).—Except for slope, which ranges from 3 to 7 percent, this soil is similar to Dublin clay, nearly level. Runoff is slow, and there is a slight hazard of erosion.

This soil has a wide variety of uses, including truck crops, irrigated pasture, dryfarming to flax and grain, and some range use. Cross-slope cultivation and other careful management are advisable. Capability unit IIe–1.

Dublin clay, sloping, eroded (DuC2).—This soil is similar to Dublin clay, nearly level, except for slope and a slightly thinner surface layer because of erosion. Slope ranges from 7 to 16 percent. A few wet spots, which affect the management practices, are present. Runoff is slow and the erosion hazard is slight. Workability is difficult.

This soil is used for a wide variety of crops, including truck crops, range, and pasture, and there is some dryfarming to flax and grain. Capability unit IIIe–1.

Dublin clay, moderately steep, eroded (DuD2).—This soil is similar to Dublin clay, sloping, eroded, but slope ranges from 16 to 31 percent. Runoff is medium and the erosion hazard is moderate.

Intensive practices, including cross-slope cultivation, terracing, and use of diversion ditches, are needed to control erosion. Capability unit IVe–5.

Dublin clay, nearly level, imperfectly drained (DwA).—This soil is similar to Dublin clay, nearly level, except for imperfect drainage. Parts of the areas are imperfectly drained because they are in basinlike positions where water collects (fig. 19). Most of these areas are in narrow valleys.

The soil has a wide variety of uses, including dryfarming, truck-crop farming, and irrigated pasture. Drainage should be provided to remove excess water, and interception of water that drains from higher areas is needed in some places. High yields can be expected under good management, but the soil is difficult to work. Capability unit IIw–2.

Dublin clay, gently sloping, imperfectly drained (DwB).—This soil is similar to Dublin clay, nearly level, imperfectly drained, except for slope. Slope ranges from 3 to 7 percent. There are a few low spots where water collects, and in a few places the surface layer is a recent deposit.

Figure 19.—**Field of Dublin clay, nearly level, imperfectly drained. After the soil is drained, it can be used for intensive cultivation.**

The soil is used for truck crops, range, pasture, and some dryfarming. Fair to high yields can be expected under good management. Drainage, cross-slope cultivation, and diversions to dispose of excess water from higher areas are advisable. Capability unit IIw–2.

Elkhorn series

The Elkhorn series consists of gently sloping to steep, well-drained soils that were developed on uplands from coastal plain sediments of mixed origin. The vegetation is chiefly coyotebrush and an understory of annual grasses. The Elkhorn soils are principally between Pescadero and Gazos Creeks, at elevations below 500 feet, and are rarely more than one-half mile inland from the ocean. They are associated with the Miramar and Denison soils north of Half Moon Bay; with Baywood soils in the vicinity of the Coast Highway and Pescadero Highway Junctions; and with Tierra, Gazos, and Watsonville soils elsewhere. The average annual rainfall is 20 to 25 inches.

The Elkhorn soils have a thick, gray to dark-gray, weakly granular surface soil of sandy loam that is slightly hard when dry. The subsoil is strong-brown to yellowish-brown, weak prismatic to moderate blocky and subangular blocky sandy clay loam that is very hard when dry. In general, the soils are slightly acid to medium acid throughout. The Elkhorn soils north of Half Moon Bay have been developed in part from granitic sediments, and differ in that way from the others.

The Elkhorn soils are used for truck and flower crops, flax, grain, and range.

Elkhorn sandy loam, sloping, eroded (EhC2).—The major areas of this soil are between Pescadero Road and Gazos Creek, but some areas are north of Half Moon Bay near the airport. Slope ranges from 5 to 11 percent. Runoff is slow and the erosion hazard is slight. The water-holding capacity is good. Permeability is moderately rapid in the surface soil and moderately slow in the subsoil. The effective depth of root penetration is deep. The soil is moderately fertile and is fairly easy to work.

Most of this soil, especially in the southern part of the Area, is used for growing brussels sprouts and other truck crops. Flax and grain are sometimes grown in rotation. Fertilizer is applied, and fair to high yields are obtained. Management needs include cross-slope cultivation and diversion of excess water. Capability unit IIIe–3.

Elkhorn sandy loam, gently sloping (EhB).—This soil is on some of the more nearly level benches between Pescadero Road and Pigeon Point. It is similar to Elkhorn sandy loam, sloping, eroded, except that the slope ranges

from 2 to 5 percent and there has been little or no erosion. Runoff is slow and the erosion hazard is slight.

This soil is used for growing brussels sprouts and other truck crops. It is also used for flax and grain grown in rotation. When intensively used, it is fertilized and yields are fair to high. Capability unit IIIs–3.

Elkhorn sandy loam, gently sloping, eroded (EhB2).—Most areas of this soil are between Pigeon Point and the Pescadero Road, but there are some areas north of Half Moon Bay near the airport. The soil is similar to Elkhorn sandy loam, sloping, eroded, except that the slope ranges from 2 to 5 percent. Runoff is slow and the erosion hazard is slight. The soil is easy to work. Capability unit IIIs–3.

Elkhorn sandy loam, moderately steep, eroded (EhD2).—This soil is similar to Elkhorn sandy loam, sloping, eroded, except that the slope ranges from 11 to 21 percent. There are a few gullies in most of the areas. Near Pigeon Point about 40 acres that are east of the highway are affected by seeps. These seepy spots are in swales where there has been very little erosion, and the soil there is generally deeper than the average. In about 30 acres of this soil, there is gravel on the surface. Runoff is medium and the erosion hazard is moderate. Workability is fairly easy.

Most of this soil is now used for growing flax, oats, barley, and some hay crops. Careful management is needed to control erosion. The soil is well suited to establishment of perennial grasses for use as pasture. Capability unit IVe–3.

Elkhorn sandy loam, moderately steep and steep, severely eroded (EhE3).—This soil occurs north of Half Moon Bay and in the vicinity of Pigeon Point. It is similar to Elkhorn sandy loam, sloping, eroded, except that the slope ranges from 11 to 41 percent. Most of the original surface soil has been removed, and numerous gullies, some very deep, are present. On a few of the more severely eroded knolls, the subsoil is exposed; these spots are lighter in color and browner than the surrounding areas.

Permeability is moderate in the surface soil and moderately slow in the subsoil. Runoff is medium to very rapid, and the erosion hazard is moderate to very high.

The soil is used principally for grazing; some areas are cultivated. Where used for flax and grain, yields are fair to low. This soil is suited to permanent vegetative cover. Capability unit VIe–3.

Elkhorn sandy loam, thick surface, gently sloping (EtB).—This soil is similar to Elkhorn sandy loam, gently sloping, except that the surface layer is thicker. More than one-half the acreage is affected by seeps, which impede cultivation. These seeps occur because of springs or because of water drainage from higher lying lands. In about 20 acres this soil is poorly drained and is located in depressions where water disposal is a problem.

This soil is used mainly for growing brussels sprouts. Fair to high yields may be expected under proper management. Capability unit IIs–3.

Elkhorn sandy loam, thick surface, sloping, eroded (EtC2).—This soil is similar in most respects to Elkhorn sandy loam, sloping, eroded, except that the surface soil is thicker. Runoff is slow and the erosion hazard is slight.

Most of the soil is used for growing brussels sprouts; some areas are used for flax and grain grown in rotation. When used intensively for truck crops, fair to high yields may be expected. Cross-slope cultivation and installing of diversion ditches are desirable practices. Capability unit IIIe–1.

Farallone series

The Farallone series consists of well-drained, nearly level to moderately steep soils on recent fans and flood plains. The soils have formed in alluvium that was derived mainly from granitic rocks. The vegetation in uncultivated areas is mainly coyotebrush and bush lupine, and there are willows and other water-loving plants along the drainageways. The Farallone soils are north of Half Moon Bay in narrow valleys that extend into the hills, and on fans that extend outward from these valleys. They are associated with Denison and Miramar soils. The elevation is mostly below 200 feet. The annual rainfall is 20 to 30 inches.

The surface soil is dark-gray, weak, granular loamy coarse sand, coarse sandy loam, or loam that is slightly hard when dry. The subsoil in most places is moderately coarse textured, stratified, slightly hard when dry, and has weak subangular blocky structure. The underlying material, which is many feet thick, consists of massive, stratified layers of sandy loam and coarse sandy loam. The profiles are slightly acid throughout.

Most of the Farallone soils are cultivated and are used for flowers, truck crops, and irrigated pasture.

Farallone coarse sandy loam, nearly level (FcA).—This soil occurs in many small areas. Slope ranges from 0 to 1 percent. In a few places there has been deposition from higher areas and the surface layer is loamy coarse sand.

Permeability is rapid. The effective depth of root penetration is very deep. Runoff is very slow, and the erosion hazard is none to slight. The soil is easy to work, but water-holding capacity and natural fertility are low.

Nearly all of this soil is cultivated and is used for growing flowers and truck crops. Fertilizer, particularly nitrogen, is needed for best yields. Because the soil is droughty for shallow-rooted crops, good irrigation practices should be used. Capability unit IIs–4.

Farallone coarse sandy loam, gently sloping (FcB).—This soil is similar to Farallone coarse sandy loam, nearly level, except for slope. Slope ranges from 1 to 4 percent. Runoff is slow, and the erosion hazard is slight.

Nearly all of this soil is used for growing flowers and truck crops. Capability unit IIs–4.

Farallone coarse sandy loam, sloping, eroded (FcC2).—This soil occurs in many small areas. Erosion has thinned the surface layer, but the profile is otherwise similar to that of Farallone coarse sandy loam, nearly level. Slope ranges from 4 to 10 percent. In about 10 acres the surface soil is loam, and in depressions wetness is a factor. Runoff is slow and the erosion hazard is slight. Workability is fairly easy.

The soil is used for growing flowers and truck crops. Fertilizer, especially nitrogen, is needed for highest yields, and cross-slope cultivation will help control erosion. Capability unit IIIe–4.

Farallone coarse sandy loam, moderately steep, eroded (FcD2).—This soil occurs in a number of small areas. It is similar to Farallone coarse sandy loam, sloping, eroded, but the slope ranges from 10 to 20 percent. In some places the surface soil is loamy coarse sand; in others it is loam. Runoff is slow to medium and the erosion hazard is moderate.

Nearly all of this soil has been cultivated at one time or another. Because of the moderately steep slopes, intensive erosion-control practices should be used. Capability unit IVe–1.

Farallone coarse sandy loam, over coarse sands, gently sloping, seeped (FsB).—This soil occurs in narrow stringers. It is similar to Farallone coarse sandy loam, gently sloping, except that it is underlain by stratified layers of coarse sand at a depth of 20 to 60 inches and there is a water-disposal problem caused by seepage from higher areas. For the most part, the subsoil consists of coarse particles of quartz derived from the adjacent granitic rocks.

This soil has a low water-holding capacity. Runoff is slow and the erosion hazard is slight. The permeability of the sandy subsoil and substratum is very rapid.

This soil is used for growing flowers and truck crops. For best use of the soil, drainage systems must be installed. Capability unit IIw–2.

Farallone loam, nearly level (FaA).—This soil is similar to Farallone coarse sandy loam, nearly level, except that the surface soil is loam that contains many coarse, gritty particles. Deeper layers are coarser in texture. Where the soil occurs in narrow stringers, deposits from adjacent sidehills sometimes make problems. In a few places there are wet spots.

Permeability is moderate in the surface soil and moderately rapid to rapid in the subsoil. The soil has good water-holding capacity and moderate fertility.

This soil is used for truck crops and flowers. Capability unit I–1.

Farallone loam, gently sloping (FaB).—This soil is similar in all respects, except for slope, to Farallone loam, nearly level. Slope ranges from 1 to 4 percent; in most places it is about 3 percent. There is a slight erosion hazard.

This soil is used for truck crops and flowers. If it is cultivated intensively, fertilizer is needed. High yields may be expected with proper management. Cross-slope cultivation is advisable. Capability unit IIe–1.

Farallone loamy coarse sand, gently sloping (FyB).—Except for having a coarser surface layer, this soil is similar to Farallone coarse sandy loam, gently sloping. The water-holding capacity is low, and permeability is very rapid. Runoff is very slow and the erosion hazard is slight.

This soil is used for growing truck crops and flowers. For best results, fertilizer, including nitrogen, must be used. Proper irrigation and cross-slope tillage to reduce soil erosion are advisable. Capability unit IIs–4.

Farallone loamy coarse sand, sloping, eroded (FyC2).—Except that the slope ranges from 5 to 10 percent, and the surface soil is thinner because of past erosion, this soil is similar to Farallone loamy coarse sand, gently sloping. Runoff is slow, and there is a slight hazard of erosion.

This soil is used for truck crops and flowers. Nitrogen fertilizer and practices to control erosion are needed. Because this is a droughty soil, good irrigation management is required. Capability unit IIIe–4.

Gazos series

The Gazos series consists of gently sloping to very steep upland soils that are well drained to somewhat excessively drained. The soils have formed in weathered products of semihard shales of the Purisima, Chico, and similar formations. They are in the Coast Range at elevations below 1,500 feet, generally in ravines and on the sides of valleys, occasionally on rounded hilltops. The Gazos soils are associated with the Lobitos, Calera, Sweeney, and Pomponio soils. The vegetation is chiefly shrubs and grasses, although Douglas-fir is present at the higher elevations. The annual rainfall is between 22 and 30 inches.

The surface soil ranges in texture from fine sandy loam to silt loam. It is grayish brown to dark grayish brown, neutral, hard when dry, and granular. In a few areas the soils are stony. The subsoil is of variable texture, but in most places the texture is silty clay loam, sandy clay loam, or clay loam. The subsoil is very hard when dry, slightly acid, and granular. Shale particles are common throughout the profile. The depth to bedrock is shallow or moderate.

The Gazos soils are used for grain, grain hay, flax, and range.

Gazos loam, very steep, eroded (GbF2).—This is one of the most extensive soils in the Area. Slope is 40 percent or more. Thickness of the remaining surface soil varies from place to place because of erosion; about 1,000 of the 3,700 acres have been only slightly eroded, and on about 500 acres there are a few gullies. The soil on the average is about 24 inches deep, but in some places it is only 10 inches, and in others it is as deep as 36 inches. On about 300 acres the surface layer is fine sandy loam.

Drainage is somewhat excessive. Runoff is very rapid, and the erosion hazard is very high. The soil is moderately permeable. The effective depth of root penetration is shallow to moderately deep. The water-holding capacity is very low to low, fertility is low to moderate, and workability is difficult.

This soil is used for grazing. Capability unit VIIe–1.

Gazos loam, sloping, eroded (GbC2).—This soil is similar to Gazos loam, very steep, eroded, except for the slope, which ranges from 5 to 11 percent. On about 20 acres the surface soil is fine sandy loam.

Drainage is good. Runoff is slow and the erosion hazard is slight. Workability is rather difficult.

This soil is used for flax and small grains. Some areas are grazed by cattle. Capability unit IIIe–1.

Gazos loam, moderately steep, eroded (GbD2).—This soil is similar to Gazos loam, very steep, eroded, except that the slope ranges from 11 to 21 percent. In most of the acreage, there are a few gullies, and about 30 acres are stony loam. Drainage is good. Runoff is medium and the erosion hazard is moderate.

This soil is used for growing flax, small grains, and grain hay. It is also used for grazing. When it is cultivated, nitrogen fertilizer should be used and erosion-control measures practiced. Capability unit IVe–1.

Gazos loam, steep, eroded (GbE2).—This soil is similar to Gazos loam, very steep, eroded, except that slope ranges from 21 to 40 percent. Drainage is good to somewhat excessive. Surface runoff is rapid and the erosion hazard is high. In about one-half of the acreage, there are a few gullies.

This soil is used for grazing. Capability unit VIe–1.

Gazos loam, moderately steep, severely eroded (GbD3).—This soil is similar to Gazos loam, moderately steep, eroded. Erosion, however, has been severe. In most of the acreage, there are a few gullies. In about one-half of the acreage there are numerous gullies, many of them so deep that they cannot be crossed by farm implements or animals. Depth of soil ranges from 10 to 20 inches.

Runoff is medium and the erosion hazard is high. The water-holding capacity is very low to low, and fertility is low. Much of the acreage is actively eroding.

This soil is not suitable for cultivation and should be maintained under permanent vegetation. Past cultivation, particularly for spring peas, caused the severe erosion. Capability unit VIe–1.

Gazos loam, dark, sloping, eroded (GdC2).—This soil occurs mainly on ridgetops in the vicinity of Cahill Ridge. It is similar to Gazos loam, sloping, eroded, except that the surface layer is dark grayish brown or very dark grayish brown. Slope ranges from 7 to 16 percent. In some places seeped water accumulates. The soil is used for flax, grain, and range. Capability unit IIIe–1.

Gazos fine sandy loam, moderately steep, eroded (GaD2).—This soil is more sandy and is steeper than Gazos loam, very steep, eroded. Slope ranges from 11 to 20 percent. Bedrock is at a depth of 20 to 36 inches. A few acres of rock outcrops are included in this mapping unit.

Drainage is good. Runoff is medium and the erosion hazard is moderate. Permeability of the surface soil is moderately rapid. The effective depth of root penetration is moderately deep. The soil is rather difficult to work. Most areas are used for flax, grain, and grain hay. Capability unit IVe–1.

Gazos fine sandy loam, steep, eroded (GaE2).—This soil is steeper and somewhat shallower than Gazos fine sandy loam, moderately steep, eroded. Slope ranges from 20 to 40 percent. Depth to the shale ranges from 10 to 36 inches, with an average of about 24 inches. In about one-half of the acreage, there are a few gullies.

Drainage is good to somewhat excessive. Runoff is rapid and the erosion hazard is high. Root penetration is shallow to moderately deep.

The soil is difficult to work and is used mostly for range that is grazed by cattle. Some areas are cultivated to flax and small grains, but the soil is not suited to cultivation and should be kept in permanent cover. Capability unit VIe–1.

Gazos-Lobitos silt loams, gently sloping (GlB).—This complex of soils occurs in the vicinity of Cahill Ridge. It consists of Gazos and Lobitos soils so intricately mixed that separation on the map is not practicable. In most places the soils are moderately deep to bedrock. Slope ranges from 3 to 6 percent. Runoff is slow and the erosion hazard is slight. Permeability is moderate, except in the Lobitos soil, where permeability of the subsoil is moderately slow. Water-holding capacity is low, fertility is moderate, and workability is easy.

These soils are used for range and for growing grain. Capability unit IIIe–1.

Gazos-Lobitos silt loams, sloping, eroded (GlC2).—This complex occurs on ridgetops in the vicinity of Half Moon Bay, and near Cahill Ridge. Except for moderate erosion, slightly shallower average depth, and a range in slope from 6 to 15 percent, it is similar to Gazos-Lobitos silt loams, gently sloping. The effective depth of root penetration is shallow to moderately deep. Runoff is slow to medium, and the erosion hazard is slight to moderate. The soils are rather difficult to work. They are used for grain and range. Capability unit IIIe–1.

Gazos-Lobitos silt loams, moderately steep, eroded (GlD2).—In this complex the range of slope is from 15 to 30 percent. The soils have been moderately eroded, and the depth to bedrock is shallower than in the similar, but gently sloping, complex. In some places there are a few gullies. The effective depth of root penetration is shallow to moderately deep. Runoff is medium and the erosion hazard is moderate. The soils are difficult to work and are used for range and for growing grain. Capability unit IVe–1.

Gazos-Lobitos silt loams, very steep (GlF).—This complex is similar to Gazos-Lobitos silt loams, gently sloping, except that the slope is 45 percent or steeper, and average depth to bedrock is less. The effective depth of root penetration is shallow to moderately deep. Runoff is very rapid, and the erosion hazard is very high. The water-holding capacity is low. The soils are difficult to work and are used only for range. Capability unit VIIe–1.

Gazos-Lobitos silt loams, steep, eroded (GlE2).—The soils of this complex are similar to Gazos-Lobitos silt loams, gently sloping, except that the dominant range of slope is from 30 to 45 percent. These soils are also moderately eroded and shallower. There are a few gullies in places. Runoff is rapid and the erosion hazard is high. The effective depth of root penetration is shallow to moderately deep. Workability is difficult, and the soils are used only for range. Capability unit VIe–1.

Gazos and Lobitos stony loams, steep, eroded (GsE2).—This unit of undifferentiated soils consists of approximately 40 percent Gazos stony loam and 60 percent Lobitos stony loam. The proportions are variable from area to area. The soils are, however, shallow to bedrock, and rock outcrops occupy about 25 percent of the surface. There are a few gullies in some places. Slope ranges from 21 to 45 percent.

Runoff is rapid and the erosion hazard is high. The soils have a very low water-holding capacity and are difficult to work. They are used only for range. Capability unit VIe–1.

Gazos and Lobitos stony loams, very steep, eroded (GsF2).—This unit of undifferentiated soils is similar to Gazos and Lobitos stony loams, steep, eroded, except that the slope is 45 percent or steeper, and the Gazos soil makes up about 80 percent of the acreage. Runoff is very rapid, and the erosion hazard is very high. The soils of this unit are used only for range. Capability unit VIIe–1.

Gazos and Lobitos soils, steep and very steep, severely eroded (GoF3).—This mapping unit includes the severely

eroded areas of Gazos and Lobitos soils. The soils are shallow or very shallow to bedrock, and the slope is 21 percent or steeper. Texture of the surface soil ranges from fine sandy loam to silt loam. Gullies are common on 60 percent of the acreage; many gullies are so deep that they cannot be crossed by livestock.

Runoff is very rapid, and the erosion hazard is very high. The water-holding capacity is very low. Fertility is very low, and the soils are difficult to work. They should be protected from livestock by fencing, and, if possible, vegetation should be established. Capability unit VIIe–1.

Gazos (dark phase)-Calera loams, sloping, eroded (GcC2).—This complex is very inextensive; it occurs in the northeastern part of the Area, where limestone is interbedded with the other rocks. Slope ranges from 7 to 16 percent. Approximately two-thirds of the complex consists of Gazos loam, dark, sloping, eroded; one-third is Calera loam, sloping, eroded. The Calera soil has a very dark grayish-brown, hard, granular, mildly alkaline surface soil that is very slightly calcareous. Its subsoil is brown, finer textured, and slightly calcareous but otherwise similar to the surface layer.

These soils are well drained and moderately permeable. Runoff is slow and the erosion hazard is slight. Effective depth of rooting is shallow to moderately deep. The water-holding capacity is low, fertility is moderate, and workability is rather difficult. The soils are used for range and for grain. Capability unit IIIe–1.

Gazos (dark phase)-Calera loams, steep, eroded (GcE2).—This complex is similar to Gazos (dark phase)-Calera loams, sloping, eroded, but the soils are shallower and the range of slope is from 31 to 45 percent. The effective depth of root penetration is shallow to moderately deep, and the water-holding capacity is very low to low. Drainage is good to somewhat excessive. Runoff is rapid and the erosion hazard is high. The soils are difficult to work and are used only for range. Capability unit VIe–1.

Gazos (dark phase)-Calera loams, very steep, eroded (GcF2).—This complex is similar to Gazos (dark phase)-Calera loams, steep, eroded, except that the slope is 45 percent or steeper. Drainage is somewhat excessive. Runoff is very rapid, and the erosion hazard is very high. Capability unit VIIe–1.

Gazos (dark phase)-Sweeney loams, steep, eroded (GkE2).—This complex occurs in the northeastern part of the Area, where basic igneous rocks and sedimentary rocks are intermingled. The Gazos and Sweeney soils are so intricately associated that separation of them on a map is not practicable. The profiles are similar to those of the two soils where they occur separately. Slope ranges from 16 to 45 percent. Drainage is good to somewhat excessive. Runoff is rapid and the erosion hazard is high. Effective depth of rooting is shallow to deep.

The soils are used only for range. Capability unit VIe–1.

Gullied land

Gullied land (alluvial soil material) (Gu).—This miscellaneous land type occurs near streams that extend through areas of Botella, Farallone, and Soquel soils. Relief along these streams ranges from gently sloping to sloping. The areas are usually well vegetated by woody plants. Streambank cutting may occur. Capability unit VIIIe–1.

Gullied land (Gazos-Lobitos soil material) (Gv).—This miscellaneous land type consists of stream channels or gullied areas that extend through areas of Gazos and Lobitos soils. The areas are sloping and are either bare or covered with willows and brush. Capability unit VIIIe–1.

Gullied land (Tierra and Watsonville soil materials) (Gw).—This miscellaneous land type consists of severely eroded areas where most of the surface soil has been removed and gullies have cut deep into the substratum. Such areas are principally on the marine terraces that give rise to Watsonville and Tierra soils.

This land is not suitable for agriculture. Measures may be needed to encourage the growth of a plant cover as well as to prevent livestock from entering and being injured. Engineering structures may be needed to control sedimentation and to protect lower lying lands. Capability unit VIIIe–1.

Hugo series

Hugo soils are well drained to somewhat excessively drained. They have formed under coniferous forest from the weathered products of sandstone and shale. These soils occur at elevations above 1,000 feet. Slope ranges from gentle to very steep. Forest trees are mostly Douglas-fir and redwood. The annual rainfall is 35 to 60 inches.

The surface soil is brown, weakly granular sandy loam or loam that is hard when dry. The subsoil is yellowish brown or light yellowish brown; it is hard when dry and has subangular blocky structure; its texture is similar to or slightly finer than that of the surface soil. Depth to bedrock is 2 to 6 feet.

These soils are used primarily for growing timber. Grain and grain hay are grown on some of the more gentle slopes, and some areas are grazed.

Hugo and Josephine sandy loams, very steep (HyF).—This is the most extensive soil mapping unit in the entire survey area. It occupies more than 14,000 acres. In general, both of the soils in this unit are 36 to 60 inches deep over bedrock. Slope is 40 percent or steeper. Runoff is very rapid, and the erosion hazard is very high. The effective depth of root penetration is deep. Natural fertility is low to moderate, and workability is difficult. The water-holding capacity of the Hugo soil is low, and that of the Josephine soil is good. Permeability is moderately rapid in the Hugo soil and in the surface soil of the Josephine; the Josephine subsoil has moderately slow permeability.

These soils are good for growing timber, particularly redwood and Douglas-fir. Capability unit VIIe–6.

Hugo and Josephine sandy loams, very steep, eroded (HyF2).—These soils are similar to Hugo and Josephine sandy loams, very steep, but are shallower because of erosion. The effective depth of root penetration is moderately deep to deep. The soils are used for growing timber. Capability unit VIIe–6.

Hugo and Josephine sandy loams, steep, eroded (HyE2).—These soils are similar to Hugo and Josephine sandy loams, very steep, except that slope ranges from

20 to 40 percent, and the depth to bedrock is less because of erosion. The effective depth of root penetration is moderately deep to deep. Runoff is rapid and the erosion hazard is high. The soils are used for growing timber. Capability unit VIe–6.

Hugo and Josephine sandy loams, steep (HyE).—Except for slope, which ranges from 20 to 40 percent, these soils are similar to Hugo and Josephine sandy loams, very steep, and the soils have the same use. Runoff is rapid and the erosion hazard is high. Capability unit VIe–6.

Hugo and Josephine sandy loams, moderately steep, eroded (HyD2).—The range of slope is from 11 to 20 percent and the depth to bedrock is less because of erosion, but these soils are otherwise similar to Hugo and Josephine sandy loams, very steep. The effective depth of root penetration is moderately deep to deep. Runoff is medium and the erosion hazard is moderate. The soils are used chiefly for growing timber; a few areas are grazed. Capability unit IVe–6.

Hugo and Josephine sandy loams, sloping, eroded (HyC2).—These soils occur on ridgetops. They are similar, except for slope, to Hugo and Josephine sandy loams, very steep, eroded. Slope ranges from 5 to 11 percent. Runoff is slow, and the hazard of erosion is slight to moderate. Workability is fairly easy. These soils are used mostly for growing timber. Some cutover areas are used for range, but the soils are not well suited to growing grass, and yields are low. Capability unit IIIe–1.

Hugo and Josephine sandy loams, very deep, sloping (HzC).—These soils occur in the vicinity of Loma Mar. They are deeper than 60 inches over bedrock, and slope ranges from 5 to 11 percent. Otherwise, these soils are similar to Hugo and Josephine sandy loams, very steep. The effective depth of root penetration is very deep, and the water-holding capacity is good. Runoff is slow, the erosion hazard is slight, and the soils are fairly easy to work. They are used for growing timber. Capability unit IIIe–1.

Hugo and Josephine sandy loams, very deep, moderately steep (HzD).—Except for having a range of slope from 11 to 20 percent, these soils are similar to Hugo and Josephine loams, very deep, sloping, and are used the same. Runoff is medium and the erosion hazard is moderate. Workability is rather difficult. Capability unit IVe–6.

Hugo and Josephine loams, sloping (HuC).—These soils range in slope from 6 to 15 percent. They are 36 to 60 inches deep over bedrock. They are moderately permeable, except in the Josephine subsoil, where permeability is moderately slow. The effective depth of root penetration is deep. The soils have good water-holding capacity and are fairly easy to work. Natural fertility is low to moderate. Runoff is slow and the erosion hazard is slight.

These soils are used mostly for growing timber. Some cutover areas are used for range, but yields of forage are low. Capability unit IIIe–1.

Hugo and Josephine loams, moderately steep (HuD).—These soils are similar to Hugo and Josephine loams, sloping, except that the range of slope is from 15 to 30 percent, and in about one-fourth of the acreage the depth to bedrock is less than 36 inches. The effective depth of root penetration is moderately deep to deep. The water-holding capacity is low to good. Workability is rather difficult. Runoff is medium and the erosion hazard is moderate. The soils are used mostly for timber; a few areas are used for range. Capability unit IVe–6.

Hugo and Josephine loams, moderately steep, eroded (HuD2).—These soils are similar to Hugo and Josephine loams, moderately steep, except that they are dominantly between 20 and 36 inches deep over bedrock. Their principal use is for growing timber; a few areas are grazed. Capability unit IVe–6.

Hugo and Josephine loams, steep (HuE).—These soils are similar to Hugo and Josephine loams, sloping, except that slope ranges from 30 to 45 percent. Because of the steep slopes, runoff is rapid and there is a high erosion hazard. The soils are difficult to work and are used only for growing timber. Capability unit VIe–6.

Hugo and Josephine loams, steep, eroded (HuE2).—These soils are similar to Hugo and Josephine loams, steep, but, because of erosion, the depth of soil is somewhat less. In about one-third of the acreage, there are a few gullies. The water-holding capacity of these soils is low to good. Runoff is rapid and the erosion hazard is high. The soils are used for growing timber. Capability unit VIe–6.

Hugo and Josephine loams, very steep (HuF).—This mapping unit is one of the most extensive in the survey area. The soils are similar to Hugo and Josephine loams, sloping, except that the slope is 45 percent or steeper and, in a few areas, the depth to bedrock is less than 36 inches. These soils are well suited to timber, particularly Douglas-fir and redwood. Capability unit VIIe–6.

Hugo and Josephine loams, very deep, gently sloping (HvB).—These soils, which occur near Loma Mar, are very inextensive. They are more than 60 inches deep, and the slope ranges from 2 to 6 percent. In other respects the soils are similar to Hugo and Josephine loams, sloping. In some places the surface soil is sandy loam. The effective depth of root penetration is very deep. These soils are easy to work and have good to high water-holding capacity. Capability unit IIe–1.

Hugo and Josephine loams, very deep, sloping (HvC).—These soils occur near Loma Mar and also in the vicinity of San Mateo County Memorial Park. The soils are more than 60 inches deep, but are similar in other respects to Hugo and Josephine loams, sloping. The moisture-holding capacity is good to high, and root penetration is very deep. The soils are used for growing timber. Capability unit IIIe–1.

Josephine series

Josephine soils, like the Hugo soils, are well drained to somewhat excessively drained. They have formed under forest, at elevations above 1,000 feet, from weathered sandstone and shale. The forest trees are mostly Douglas-fir and redwood. Slope ranges from gentle to very steep. The annual rainfall is 35 to 60 inches.

The Josephine soils have light yellowish-brown or light-brown, but in places grayish-brown or brown, granular loam or sandy loam surface layers that are slightly hard when dry. Their subsoils, typically brown but in places light brown, reddish yellow, or pink, are hard when dry and are subangular blocky clay loams. Bedrock most commonly is at a depth of 3½ to 5 feet but ranges from 3 to 6 feet.

These soils are used primarily for growing timber. Grain and grain hay are grown on some of the more gentle slopes, and some areas are grazed.

Josephine soils occur in such close association with Hugo soils that their separation on a map is not practicable. All the mapping units are undifferentiated groups of Hugo and Josephine soils.

Laughlin series

The Laughlin series consists of sloping to very steep, well-drained to somewhat excessively drained soils that were formed on uplands from noncalcareous, siliceous Monterey shale or Vaqueros sandstone. The vegetation on the ridgetops and southern exposures is mainly grass; on northern exposures, in sheltered areas, and in swales, it consists of brush shrubs, scattered oaks, and conifers. The Laughlin soils are in the hilly and mountainous areas of the Coast Range, particularly near Skyline Boulevard and in the southern part of the Area. They occur at elevations above 1,000 feet. The soils are associated with Hugo, Gazos, Santa Lucia, and Sweeney soils. The annual rainfall is 35 to 50 inches.

The surface soil is grayish-brown, slightly hard when dry, medium acid, granular loam. The subsoil is hard when dry, weak, subangular blocky to massive, medium acid loam or silt loam. The depth to bedrock is dominantly between 20 and 36 inches.

The Laughlin soils are used mainly for grazing. The least sloping areas are used for grain and grain hay. Cultivated and overgrazed areas are very susceptible to erosion.

Laughlin loam, steep, eroded (LaE2).—This soil dominantly is 20 to 36 inches deep over bedrock, with some areas shallower than 20 inches. Slope ranges from 31 to 46 percent. There are a few gullies. In some places the surface soil is sandy loam or stony loam. Runoff is rapid and the erosion hazard is high. Root penetration is shallow to moderately deep. The soil is moderately permeable, has low water-holding capacity, and is moderate in fertility. Workability is difficult.

This soil is used mostly for range; some areas are used for growing timber. Capability unit VIe–1.

Laughlin loam, very steep, eroded (LaF2).—This is the most extensive soil of the series. It is similar to Laughlin loam, steep, eroded, except that the slope is 46 percent or steeper. About 100 acres that have a stony loam surface soil are included in the mapping unit. Runoff is very rapid, and the erosion hazard is very high.

This soil is used for grazing and watershed and for growing timber. Capability unit VIIe–1.

Laughlin loam, moderately steep, eroded (LaD2).—This soil is slightly deeper on the average than Laughlin loam, steep, eroded, and the slope ranges from 16 to 31 percent. Otherwise, the two soils are similar. A few gullies are present in about 25 percent of the areas. Small areas in which the surface soil is sandy loam or clay loam have been included in this mapping unit.

The effective depth of root penetration is shallow to moderately deep. The water-holding capacity of the soil is low. Runoff is medium and the erosion hazard is moderate.

This soil is used for range and for grain. Capability unit IVe–1.

Laughlin loam, sloping, eroded (LaC2).—Except for a deeper profile and a range of slope from 7 to 16 percent, this soil is similar to Laughlin loam, steep, eroded. Some small areas that have sandy loam or clay loam surface soil are included. Runoff is slow to medium, and the erosion hazard is slight to moderate. Root penetration is shallow to moderately deep. The soil has low water-holding capacity and is rather difficult to work. It is used mostly for grazing; grain and hay are grown in a few areas. Capability unit IIIe–1.

Laughlin-Sweeney loams, sloping, eroded (LbC2).—This complex of soils is on ridgetops along Skyline Boulevard south of Old La Honda Road. It consists of about equal amounts of Laughlin loam, sloping, eroded, and Sweeney loam, sloping, eroded. The range of slope is from 7 to 15 percent.

The effective depth of root penetration is moderately deep to deep. Permeability is moderate, except in the subsoil of the Sweeney soil, where it is moderately slow. Runoff is slow to medium, and the erosion hazard is slight to moderate. The water-holding capacity is low to high, and fertility is moderate to high. Workability is rather difficult.

These soils are used for grain, grain hay, and range. Capability unit IIIe–1.

Laughlin-Sweeney loams, moderately steep, eroded (LbD2).—This complex is similar to Laughlin-Sweeney loams, sloping, eroded, except that range of slope is from 15 to 31 percent and the depth to bedrock is less. These areas are along Skyline Boulevard between Old La Honda Road and Alpine Road. Here and there, a few gullies are present.

The effective depth of root penetration is shallow to deep. Runoff is medium and the erosion hazard is moderate. The soils are difficult to work. They are used for grain, grain hay, and range. Capability unit IVe–1.

Laughlin-Sweeney loams, steep, eroded (LbE2).—This complex is similar to Laughlin-Sweeney loams, sloping, eroded, except that the depth to bedrock is less and the range of slope is from 31 to 45 percent. There are a few gullies in about half the areas mapped. In some places the surface soil is stony loam.

Runoff is rapid and the erosion hazard is high. Root penetration is shallow to deep. The soils are difficult to work and are used only for range. Capability unit VIe–1.

Laughlin-Sweeney loams, very steep, eroded (LbF2).—Except for slope, which is 45 percent or steeper, and the shallower depth to bedrock, this complex is similar to Laughlin-Sweeney loams, sloping, eroded. Small areas that have a surface soil of clay loam are included in the mapping unit.

The water-holding capacity of these soils ranges from low to high, and root penetration, from shallow to deep. Workability is difficult. Runoff is very rapid, and there is a very high erosion hazard. These soils are used only for range. Capability unit VIIe–1.

Lobitos series

The Lobitos series consists of sloping to very steep, well-drained to somewhat excessively drained soils that were formed on uplands from semihard shales of the Purisima and similar formations. The soils occur at elevations below 1,000 feet in areas cut by many drainage-

ways. They are associated with Gazos, Pomponio, and other soils of the uplands. The vegetation is grasses and brush. The annual rainfall is 25 to 30 inches.

The surface soil is very dark gray, hard when dry, medium acid, subangular blocky fine sandy loam, loam, or silt loam. The subsoil is light olive-brown or pale-brown, very hard when dry, strongly acid, subangular blocky silty clay that contains a great many fragments of weathered shale the size of gravel and cobblestones. Bedrock is at a depth dominantly between 2 and 4 feet.

These soils are used primarily for grazing and for growing flax, grain, and grain hay.

Lobitos loam, steep, eroded (LlE2).—This soil has a range of slope from 30 to 41 percent. It is 20 to 36 inches deep over fine-grained sandstone or shale, except in a few places where the depth is less than 20 inches. In more than one-half of the areas there are a few gullies, some of which are deep.

Permeability is moderate in the surface soil and moderately slow in the subsoil. The soil has low water-holding capacity, is moderately fertile, and is difficult to work. Runoff is rapid and the erosion hazard is high.

This soil is used for range and affords good forage in the winter and spring months. If trampled by livestock when it is wet, the soil may become puddled and crusted, increasing the runoff. Capability unit VIe–1.

Lobitos loam, very steep, eroded (LlF2).—This soil is similar to Lobitos loam, steep, eroded, but slope is 41 percent or steeper and in places the surface layer is fine sandy loam. Approximately one-sixth of the areas have a few gullies. Runoff is very rapid, and the erosion hazard is very high.

This soil is used for range. The steeper areas are often covered by brush and produce little usable forage. Capability unit VIIe–1.

Lobitos loam, moderately steep, eroded (LlD2).—Except for slope that ranges from 16 to 30 percent, this soil is similar to Lobitos loam, steep, eroded. There are a few gullies in about 25 percent of the areas. Runoff is medium and the erosion hazard is moderate.

This soil is used for flax, barley, grain hay, and range. When it is cultivated, measures to control erosion must be used intensively. This soil is best maintained under a permanent vegetative cover. Capability unit IVe–1.

Lobitos loam, sloping, eroded (LlC2).—This soil is similar to Lobitos loam, steep, eroded, except that the slope ranges from 7 to 16 percent. Most of the areas are moderately eroded, but about 60 acres are only slightly eroded. There are very few gullies. Runoff is slow to medium and the erosion hazard is slight. Workability is rather difficult.

This soil is used for flax, grain, and grain hay. Much of it is grazed. Capability unit IIIe–1.

Lobitos loam, deep, moderately steep, eroded (LdD2).—This soil is similar to Lobitos loam, moderately steep, eroded, except for greater depth. The effective rooting depth is deep, and the water-holding capacity is good.

The soil is used for grain, flax, and range. Capability unit IVe–1.

Lobitos loam, deep, sloping, eroded (LdC2)—This soil is inextensive and occurs on the toe slopes of hills. It is similar to Lobitos loam, sloping, eroded, except that the underlying fine-grained sandstone or shale is at a depth of 36 to 60 inches. The effective depth of root penetration is deep, and the soil has good water-holding capacity.

This soil is used for flax, barley, and grain hay. Some is used for range. Capability unit IIIe–1.

Lobitos fine sandy loam, sloping, eroded (LfC2).—This soil is similar to Lobitos loam, steep, eroded, except that slope ranges from 5 to 11 percent and the surface soil is fine sandy loam. There are a few gullies in most of the areas. Permeability of the surface soil is moderately rapid. Runoff is slow to medium, and the erosion hazard is slight. The soil is rather difficult to work. It is used for flax, grain, grain hay, and range. Capability unit IIIe–1.

Lobitos fine sandy loam, moderately steep, eroded (LfD2).—This soil is used the same as Lobitos fine sandy loam, sloping, eroded, and is similar to it, except that slope ranges from 11 to 21 percent. Runoff is medium and the erosion hazard is moderate. The soil is difficult to work. Capability unit IVe–1.

Lobitos fine sandy loam, steep, eroded (LfE2).—Except for slope that ranges from 21 to 40 percent, this soil is like Lobitos fine sandy loam, sloping, eroded. Runoff is rapid and the erosion hazard is high. Workability is difficult. This soil is used mainly for range. Capability unit VIe–1.

Lockwood series

The Lockwood series consists of nearly level to sloping, well-drained to imperfectly drained soils that were formed from alluvial sediments derived from hard, white siliceous shales. These soils occur at elevations of about 50 to 150 feet on alluvial fans throughout the Area. They are principally near Pescadero along Butano Creek and a few other minor coastal drainages to the south. They are associated chiefly with Corralitos, Dublin, Soquel, Santa Lucia, and Butano soils. The vegetation in uncultivated areas is dense grass, a few scattered oaks, and brush, and willows that grow along the streams. The average annual rainfall is 20 to 30 inches.

The Lockwood soils contain varying amounts of shale fragments throughout the profile. In some places these fragments are numerous enough to hinder cultivation and to influence water-holding capacity and permeability. The surface soil is very hard when dry, medium acid loam or shaly loam that ranges in color from light gray to grayish brown. The lighter colored areas of the soil are usually of more recent origin. The subsoil, also very hard when dry, is grayish-brown, slightly acid shaly clay loam.

The Lockwood soils are used for truck crops and, in a few areas, for beans, grain, flax, and range (fig. 20).

Lockwood loam, gently sloping (LmB).—This soil is in stringer valleys in the northern part of the Area. Slope ranges from 3 to 6 percent. Runoff is slow and the erosion hazard is slight. The effective depth of root penetration is very deep. The soil has a high water-holding capacity and moderate fertility, and it is easy to work. Permeability is moderate in the surface soil and moderately slow in the subsoil.

Most of this soil is used for dry-farmed crops, such as grain and flax, and for brussels sprouts, artichokes, and several other truck crops. When the soil is used intensively, fertilizer, including nitrogen, should be used.

Figure 20.—**Field of grain on Lockwood loam, brown subsoil variant. Santa Lucia and Butano loams in the background.**

Cross-slope cultivation is advisable for erosion control. Capability unit IIe–1.

Lockwood loam, sloping, eroded (LmC2).—Erosion has thinned the surface layer of this soil in most places, and slope ranges from 6 to 16 percent. This soil is otherwise similar to Lockwood loam, gently sloping. A few areas have a surface soil of shaly loam, and a few acres steeper than 16 percent are included in the mapping unit.

Runoff is slow to medium, and there is a slight to moderate hazard of erosion. Workability is fairly easy. The soil is used mostly for irrigated pasture. It also is dryfarmed, and some is used for truck crops. Yields are fair to high. Fertilizer, especially nitrogen, is needed for best yields. Capability unit IIIe–1.

Lockwood loam, gently sloping, seeped (LwB).—This is the most extensive soil of the series in this Area. Except for slope of 3 to 6 percent and imperfect drainage and seeps, this soil is similar to Lockwood loam, gently sloping. The seeps, which interfere with cultivation, are caused by springs or water that drained from higher areas. About 40 percent of the acreage is not affected by seeps, but there is a high water table much of the time. In a few places the soil contains a considerable amount of gravel and shale fragments.

The soil occurs in many scattered areas. It is used for a variety of purposes, including pasture, dryfarming to grain and flax, and some truck crops. High yields can be obtained, but fertilizer should be used when the soil is cultivated intensively. Cross-slope tillage and drainage to intercept seepage water are advisable. Capability unit IIw–2.

Lockwood loam, sloping, seeped (LwC).—This very inextensive soil is similar to Lockwood loam, gently sloping, seeped, except that the slope ranges from 6 to 16 percent. Runoff is slow to medium, and the erosion hazard is slight to moderate. Capability unit IIIe–1.

Lockwood loam, nearly level, imperfectly drained (LoA).—This soil occurs in small stringers in alluvial valleys. It is imperfectly drained and slopes range from 0 to 2 percent, but it is otherwise similar to Lockwood loam, gently sloping. In a few places the soil contains particles of shale, and some areas are underlain by a slowly permeable clay layer at a depth of 10 to 36 inches. Moisture from higher areas has caused seeps or a high water table, and disposal of this water is a problem.

Runoff is very slow. There is little or no erosion hazard; fresh alluvium is deposited on the surface occasionally. Workability is fairly easy.

Much of this soil is used for irrigated pasture, and a few areas are used for truck crops. Drainage is needed. Capability unit IIw–2.

Lockwood shaly loam, gently sloping (LsB).—This soil is similar to Lockwood loam, gently sloping, except that there are large amounts of shale and gravel in the surface layer and throughout the profile. Permeability is more rapid, and the water-holding capacity is lower—

usually good instead of high—where the content of shale and gravel is greatest.

This soil has a variety of uses, including truck crops, pasture, and some dryfarming to grain and flax. A few areas are grazed. Capability unit IIe–1.

Lockwood loam, brown subsoil variant, gently sloping, eroded (LvB2).—The main area of this soil occurs approximately 1 mile north of the San Mateo-Santa Cruz County line. Slope ranges from 3 to 6 percent, although a small area having slope of less than 3 percent is included. A representative profile of this soil is more acid and has a browner, finer textured subsoil than a soil of the Lockwood series.

The surface soil is grayish-brown, slightly hard when dry, subangular blocky loam. The subsoil is light yellowish-brown (strong brown when moist), very hard when dry, nearly massive, heavy clay loam. The soil is strongly acid throughout.

Runoff is slow; water accumulates in low spots and in some of the more nearly level areas. There is a slight hazard of erosion. The effective depth of root penetration is deep. Permeability is moderate in the surface soil and slow in the subsoil. The water-holding capacity is good, and fertility is moderate. The soil is easy to work. It is used principally for growing flax and grain, and yields are fair. Capability unit IIIs–3.

Lockwood loam, brown subsoil variant, sloping, eroded (LvC2).—This soil is similar to Lockwood loam, brown subsoil variant, gently sloping, eroded, except that slope ranges from 6 to 15 percent. Runoff is slow to medium, and the erosion hazard is slight to moderate. Workability is fairly easy.

This soil is used principally for flax grown in rotation with hay and grain. It is occasionally used for truck crops. When it is cultivated, cross-slope cultivation, diversions, and utilization of crop residues will help protect the soil from erosion. Capability unit IIIe–3.

Lockwood loam, brown subsoil variant, moderately steep, eroded (LvD2).—Except for slope of 15 to 20 percent, this soil is similar to Lockwood loam, brown subsoil variant, gently sloping, eroded. Runoff is medium and the erosion hazard is moderate. Workability is rather difficult.

The soil is used for growing flax. Capability unit IVe–3.

Los Gatos series

The Los Gatos series consists of sloping to very steep, well-drained to somewhat excessively drained soils that were formed on uplands from metamorphosed sedimentary rocks of the Franciscan formation. Locally, these rocks contain large quantities of chert. The vegetation is mainly brush and scattered oaks. There are a few open, grass-covered areas, and, on the north-facing slopes, there are rather dense stands of oak. Los Gatos soils are east of Skyline Boulevard in the eastern part of the Area. They occur principally in association with the Josephine soils. The annual rainfall is about 35 inches.

The surface soil is brown to dark reddish-brown, slightly hard when dry, neutral to slightly acid, strong granular loam or clay loam. The subsoil, slightly finer textured than the surface soil, is also slightly hard and neutral to slightly acid, but dark red to reddish brown and subangular blocky. Bedrock normally is at a depth of 2 to 4 feet.

The Los Gatos soils are used for wildlife, watershed, and some range.

Los Gatos loam, very steep (LzF).—This soil is moderately deep to bedrock. Slope is 46 percent or steeper. Drainage is somewhat exesssive. Runoff is very rapid, and the erosion hazard is very high. Permeability is moderate in the surface soil and moderately slow in the subsoil. The soil has a low water-holding capacity, is moderate in fertility, and is difficult to work. It is used only for watershed. Capability unit VIIe–1.

Los Gatos clay loam, sloping, eroded (LyC2).—This soil is similar to Los Gatos loam, very steep, except that the surface soil is clay loam and the slope ranges from 7 to 30 percent. In addition, this soil is deeper. Permeability of the surface soil is moderately slow. Runoff is slow to medium, and there is a slight to moderate erosion hazard. Drainage is good. The effective depth of root penetration is moderately deep to deep, and the water-holding capacity is good. Workability is rather difficult.

This soil has a dense cover of oak and brush and is used for wildlife protection and for watershed. Capability unit IIIe–1.

Los Gatos clay loam, steep, eroded (LyE2).—Except for the texture of the surface soil and slope that ranges from 30 to 46 percent, this soil is similar to Los Gatos loam, very steep. It is used only for watershed. Drainage is good. Runoff is rapid and the erosion hazard is high. Capability unit VIe–1.

Mindego series

The Mindego series consists of steep to very steep, well-drained to somewhat excessively drained soils that were formed on uplands from basalt. The vegetation consists chiefly of redwood and Douglas-fir. Some hardwoods, such as madrone and California black oak, also are present. The understory of shrubs and herbs is sparse. The Mindego soils are in deep, moist ravines in the Coast Range and are associated with the Santa Lucia and Lobitos soils. Most areas are above elevations of 1,000 feet. The annual rainfall is 40 to 50 inches.

The surface soil is very dark gray, very hard when dry, neutral, subangular blocky clay loam. The subsoil is very dark grayish-brown, extremely hard, slightly acid, subangular blocky clay. In places there are stones and cobbles on the surface and throughout the profile. Basalt bedrock is at a depth of 2 to 5 feet.

The Mindego soils are used for growing timber, particularly redwood.

Mindego clay loam, very steep (MdF).—In most places this soil is 36 to 60 inches deep over basalt; a few small areas are shallower. Slope is 45 percent or steeper. Past erosion has been slight, although there are a few shallow gullies in some places. The mapping unit includes some areas in which the surface soil is loam.

Runoff is very rapid, and the erosion hazard is very high. Drainage is somewhat excessive. The effective depth of root penetration is moderately deep to deep. Permeability is moderately slow in the surface soil and slow in the subsoil. The soil has good to high water-holding capacity and high fertility. It is difficult to work and is used only for growing timber. Capability unit VIIe–6.

Mindego clay loam, steep (MdE).—This soil is similar to Mindego clay loam, very steep, but the slope ranges from 31 to 45 percent. About 20 acres are affected by seeps or springs. A few areas in which the slope ranges from 16 to 31 percent are included in the mapping unit.

Runoff is rapid and the erosion hazard is high. Drainage is good. The effective depth of root penetration is moderately deep to deep. This soil is used for growing timber. Capability unit VIe–6.

Mindego stony clay loam, very steep (MgF).—This soil is similar to Mindego clay loam, very steep, except that there are scattered stones and cobbles on the surface and throughout the profile. This soil occurs in the vicinity of Mindego and Langley Hills and is used only for growing timber. Capability unit VIIe–6.

Miramar series

The Miramar series consists of sloping to very steep, well-drained to somewhat excessively drained soils that were formed on uplands from quartz diorite. The vegetation is mostly brush. The Miramar soils are in the hilly and mountainous areas in the northern part of the survey area at elevations below 2,000 feet. They are associated chiefly with the Sheridan soils. The average annual rainfall is 22 to 40 inches.

The surface soil is grayish-brown or dark grayish-brown, hard when dry, weakly granular coarse sandy loam. The subsoil is light-brown, brown, or yellowish-brown, very hard, blocky, sandy clay loam or clay loam. The soil is slightly acid throughout the profile. Weathered quartz diorite that crushes easily to coarse loamy sand when it is moist is present at a depth dominantly below 20 inches. This material gradually becomes harder with depth.

The Miramar soils are used mainly for range, but some areas are used for small grains. Cleared and cultivated areas are highly susceptible to sheet erosion.

Miramar coarse sandy loam, steep, eroded (MmE2).—This soil is moderately deep or deep over the bedrock; it is shallowest on ridgetops. Slope ranges from 21 to 40 percent. Erosion varies from place to place. Most of the areas are moderately eroded, and there are a few gullies. About 400 of the more than 1,000 acres mapped are only slightly eroded. There is less clay in the subsoil at higher elevations than at lower elevations.

Runoff is rapid and the erosion hazard is high. Permeability is rapid in the surface soil and moderately slow in the subsoil. The effective depth of root penetration is moderately deep to deep. The water-holding capacity and natural fertility are low, and the soil is difficult to work. It is used for range and watershed. Capability unit VIe–4.

Miramar coarse sandy loam, sloping, eroded (MmC2).—This soil is similar to Miramar coarse sandy loam, steep, eroded, except that slope ranges from 5 to 11 percent.

Runoff is slow to medium, and the erosion hazard is slight to moderate. Workability is fairly easy.

This soil is used for pasture and small grains. In cultivated areas practices to control erosion are needed. Capability unit IIIe–1.

Miramar coarse sandy loam, moderately steep, eroded (MmD2).—Except for a slope range of 11 to 21 percent, this soil is similar to Miramar coarse sandy loam, steep, eroded. In some areas there are a few gullies. Workability is rather difficult. Runoff is medium and the erosion hazard is moderate.

The soil is used for range and for grain. Capability unit IVe–1.

Miramar coarse sandy loam, steep, severely eroded (MmE3).—This soil is similar to Miramar coarse sandy loam, steep, eroded, but it is thinner because of past erosion. The dominant range of slope is from 21 to 40 percent, but about 50 acres have slope from 11 to 21 percent.

The effective depth of root penetration is moderately deep, and the water-holding capacity is low. Runoff is rapid and the erosion hazard is high.

This soil is used for range and watershed. Capability unit VIIe–4.

Miramar coarse sandy loam, very steep, eroded (MmF2).—This is the most extensive soil in the Miramar series. The subsoil contains less clay and slope is 41 percent or steeper, but the soil is otherwise the same as Miramar coarse sandy loam, steep, eroded. The soil is moderately deep. Gullies are present in about 10 percent of the areas. Drainage is somewhat excessive, runoff is very rapid, and the erosion hazard is very high.

This soil is used for watershed. Capability unit VIIe–4.

Mixed alluvial land

Mixed alluvial land (Ma).—This miscellaneous land type consists of sandy and gravelly deposits along streams. Slope ranges as much as 11 percent. Most of these areas are covered with vegetation. In some places streambank cutting and erosion have occurred. Capability unit VIIIe–1.

Montara series

The Montara series consists of shallow, stony, steep to very steep, well-drained to somewhat excessively drained soils that were formed on uplands from greenish serpentine rock. The one Montara soil in the San Mateo Area is in the northeastern part of the Area at elevations above 2,000 feet. The vegetation is mostly brush. The average annual rainfall is 20 to 30 inches.

The surface soil is grayish brown to very dark grayish brown, neutral to slightly acid, very hard when dry, and stony. Texture ranges from loam to clay, although stony loam is the only type in this Area. The subsoil is similar to the surface soil but is slightly finer textured and neutral to mildly alkaline. It is underlain by bedrock at a depth of a few inches to about 2 feet.

The Montara soil is used only for watershed.

Montara stony loam, steep and very steep, eroded (MoF2).—This is the only soil of the Montara series mapped in the Area. Slope ranges from 21 to more than 40 percent. A few acres with slope of less than 21 percent are included. Runoff is rapid to very rapid, and the erosion hazard is high to very high. Permeability is moderate in the surface soil and moderately slow in the subsoil. The water-holding capacity is very low, and fertility is low. The effective depth of root penetration is shallow. The soil is difficult to work, and its only use is for watershed. Capability unit VIIe–1.

Pomponio series

Soils of the Pomponio series have a dense, claypan subsoil that is underlain by semihard shale from which the soil material was derived. These moderately well drained and well drained soils have been formed under vegetation of grasses and a few scattered oaks. They are in concave positions in the uplands of the southern part of the San Mateo Area, mainly at elevations above 500 feet. They are associated with Gazos and Lobitos soils. The annual rainfall is 25 to 30 inches.

The surface soil is gray, very hard when dry, slightly acid, granular loam or clay loam. The subsoil is grayish-brown, extremely hard, slightly acid, blocky clay that is very sticky and plastic when wet. Bedrock is at a depth of 24 to 40 inches.

The Pomponio soils are used chiefly for range. They provide good forage in the winter and spring months, except in wet and seeped spots. Some areas are cultivated to flax, grain, and hay.

Pomponio loam, moderately steep, eroded (PpD2).—This soil is shallow to moderately deep over the dense claypan. Slope ranges from 11 to 20 percent. A few gullies are present, and seeps and wet spots occur in swales. Runoff is medium and the erosion hazard is high. The surface soil is moderately permeable, and the subsoil is very slowly permeable. The soil has a low water-holding capacity, is low in fertility, and is difficult to work. It is used for range, flax, grain, and hay. When it is cultivated, erosion-control practices are advisable. Capability unit IVe–3.

Pomponio loam, sloping, eroded (PpC2).—This soil is similar to Pomponio loam, moderately steep, eroded, except that the range of slope is from 5 to 11 percent and gullies are less common. Runoff is slow to medium, and the erosion hazard is slight to moderate. Workability is rather difficult.

The soil was formerly used for spring peas, but now it is used for range, flax, grain, and hay. Capability unit IIIe–3.

Pomponio loam, steep, eroded (PpE2).—Except for a shallower depth to the claypan and a slope range of 20 to 40 percent, this soil is similar to Pomponio loam, moderately steep, eroded. A few gullies, some of them very deep, are present in most of the areas. The effective depth of root penetration is shallow. Runoff is rapid, and the erosion hazard is very high.

This soil is used principally for range. Capability unit VIe–3.

Pomponio clay loam, sloping, eroded (PoC2).—This soil is similar to Pomponio loam, moderately steep, eroded, except that the slope ranges from 5 to 11 percent and the surface soil is clay loam. The permeability of the surface soil is moderately slow, and the effective depth of root penetration is shallow to moderately deep. Runoff is slow to medium, and the erosion hazard is slight to moderate. The soil has a low water-holding capacity. It is rather difficult to work.

This soil is used for flax, grain, hay, or range. Capability unit IIIe–3.

Pomponio clay loam, moderately steep, eroded (PoD2).—Except for a range of slope of from 11 to 20 percent, this soil is similar to Pomponio clay loam, sloping, eroded, and the soils have the same use. A few gullies are present in most of the areas. Runoff is medium and the erosion hazard is high. The soil is difficult to work. Capability unit IVe–3.

Rough broken land

Rough broken land (Rb).—This miscellaneous land type consists of very steep rocky uplands. In most places the slope is steeper than 41 percent. Rock outcrops occupy about half the surface area, and there is seldom more than a 10-inch thickness of soil material. The rocks are granite, Monterey shale, sandstone, or basalt. The vegetation is mainly shrubs and a few trees.

This land is used as watershed. Capability unit VIIIe–1.

Santa Lucia series

The Santa Lucia series consists of well-drained to excessively drained, sloping to very steep soils that were formed on uplands from weathered, white siliceous shales of the Monterey formation. The vegetation is chiefly coyotebrush, annual grasses, and a few coniferous trees. Manzanita is common on the shallower soils. The Santa Lucia soils are extensive and occur throughout the Area at elevations ranging from nearly sea level to about 2,400 feet. They are associated mainly with the Hugo, Butano, Lobitos, Gazos, and Sweeney soils. The average annual rainfall is 20 to 30 inches.

The surface soil is gray, hard when dry, slightly acid, weakly granular loam that contains many platy shale fragments. The subsoil, similar in texture to the surface soil, is grayish brown, hard, massive, very strongly acid, and very shaly. In many places there are outcrops of shale, and in general the soil is very shallow or shallow, although some areas are deeper.

The Santa Lucia soils are used mostly for grazing; a few areas are cultivated.

Santa Lucia loam, very steep, eroded (SaF2).—This soil occurs on sidehills where the slope is 45 percent and steeper. In most places the soil is only 10 to 20 inches deep, but in some it is as deep as 36 inches. Erosion varies from place to place; about half the areas are only slightly eroded. In some places there are a few gullies. Drainage is somewhat excessive. Runoff is very rapid, and the erosion hazard is very high. The effective depth of root penetration is shallow to moderately deep. The soil is moderately permeable. It has a low water-holding capacity, is low in fertility, and is difficult to work.

This soil is too steep for intensive use. Many areas are brush covered and are idle. A few areas are used for range; yields are fair to low. Capability unit VIIe–1.

Santa Lucia loam, sloping, eroded (SaC2).—This soil occurs on ridgetops and bench areas. Except for slope, which ranges from 7 to 16 percent, it is similar to Santa Lucia loam, very steep, eroded. Depth to the underlying shale bedrock is dominantly between 20 and 36 inches, but in some places the soil is as deep as 5 feet. Drainage is good. Runoff is slow to medium, and the erosion hazard is slight to moderate. The effective depth of root penetration is moderately deep to deep. The water-holding capacity is low to good. Workability is rather difficult.

Practically all of this soil is used for range. The grass-covered areas have a fair carrying capacity; the brush-covered areas have a low carrying capacity. A few areas

are cultivated. Yields are fair, and crops respond well to fertilizer, especially nitrogen. Because of slope, tillage and planting operations should be on the contour, and all crop residues should be returned to the soil. Capability unit IIIe–1.

Santa Lucia loam, moderately steep, eroded (SaD2).—This soil is similar, in most respects, to Santa Lucia loam, very steep, eroded, except that slope ranges from 16 to 31 percent. This soil occurs mainly on ridgetops or in bench areas. A few gullies occur on about 20 percent of the areas. On about 100 acres the surface soil is stony loam. Drainage is good. Runoff is medium and the erosion hazard is moderate. Workability is rather difficult.

The soil is used mostly for range; a few areas are cultivated. Capability unit IVe–1.

Santa Lucia loam, steep, eroded (SaE2).—This soil is mainly on the steeper ridgetops and sidehills. The range of slope is dominantly from 31 to 45 percent. Except for slope, this soil is similar to Santa Lucia loam, very steep, eroded. There are a few gullies on about 30 percent of the areas. A few places are only slightly eroded. Drainage is good. Runoff is rapid and the erosion hazard is high.

The soil is used principally for range and has a fair carrying capacity. Capability unit VIe–1.

Santa Lucia loam, steep and very steep, severely eroded (SaF3).—This soil occurs on the steeper ridgetops and some sidehills. The slope is greater than 31 percent. Most of these areas have been burned and overgrazed, and some have been cultivated. This has resulted in severe loss of surface soil by erosion. Large outcrops of shale are exposed, and in many areas the depth to bedrock is less than 10 inches. In much of the acreage, the soil has been denuded in preparing firebreaks. The soil that remains is a loam throughout and contains a moderate number of shale fragments. Drainage is somewhat excessive. Runoff is rapid to very rapid, and the erosion hazard is very high. The water-holding capacity is very low to low.

Many of the areas are idle; the more accessible ones are used for range in conjunction with more productive soils. Forage yields are low. Capability unit VIIe–1.

Santa Lucia stony loam, steep, eroded (SbE2).—This soil occurs on slopes of 21 to 45 percent on ridgetops and sidehills. The surface soil is stony and rock outcrops are common, but the soil is similar in other respects to Santa Lucia loam, very steep, eroded. Runoff is rapid, and there is a high erosion hazard.

A few areas of this soil are grazed, but most are brush covered and idle. The areas used as range produce fair to low yields of forage. Capability unit VIe–1.

Santa Lucia stony loam, very steep, eroded (SbF2).—This soil is similar to Santa Lucia stony loam, steep, eroded, except that the slope is 45 percent or steeper. Drainage is somewhat excessive. Runoff is very rapid, and the erosion hazard is very high.

The vegetation consists mainly of shrubs. Most areas are idle, but some are used for grazing. Capability unit VIIe–1.

Santa Lucia stony loam, steep and very steep, severely eroded (SbF3).—This soil is similar to Santa Lucia stony loam, steep, eroded, except that erosion has been even more severe. Slope in most places is 41 percent or steeper; about 20 acres of slope ranging from 21 to 41 percent are included. Runoff is rapid to very rapid, and the erosion hazard is very high. The water-holding capacity is very low to low.

The soil is used only for range and watershed. Capability unit VIIe–1.

Santa Lucia stony loam, very shallow, steep and very steep, severely eroded (ScF3).—This soil is very shallow; in many places there are only a few inches of soil over the bedrock, and rock outcrops are common. Slope is mostly 21 percent or steeper. Drainage is excessive, runoff is very rapid, and the erosion hazard is very high. The available water-holding capacity is very low.

This soil is covered with brush and is used only for watershed. Capability unit VIIe–1.

Sheridan series

The Sheridan series consists of moderately steep to very steep, well-drained to somewhat excessively drained soils that were formed on uplands from quartz diorite. The vegetation is coniferous forest, chiefly Douglas-fir and an understory of laurel, ferns, and mosses. The Sheridan soils occur northwest of Pilarcitos Lake at elevations above 1,000 feet. They are associated with Miramar and Montara soils. The annual rainfall is 35 to 45 inches.

The surface soil is very dark grayish-brown, soft when dry, neutral, granular coarse sandy loam. The subsoil is brown, slightly hard, neutral to slightly acid, and subangular blocky. There is little or no increase in clay in the subsoil. Bedrock is normally at a depth between 36 and 60 inches, but it ranges from 18 inches to deeper than 60 inches. In the areas of more shallow soil, there are rock outcrops.

Areas in which these soils occur are owned mainly by the San Francisco Water Company and are used as watershed.

Sheridan coarse sandy loam, very steep (ShF).—This soil is 36 to 60 inches deep over bedrock. Slope is 40 percent or steeper, and drainage is somewhat excessive. Runoff is rapid and the erosion hazard is high. Permeability of water through the soil is rapid. The effective depth of root penetration is deep. The water-holding capacity is low, and natural fertility is low. Workability is difficult.

The soil is used for watershed and for growing timber. Capability unit VIIe–6.

Sheridan coarse sandy loam, steep (ShE).—This soil is similar to Sheridan coarse sandy loam, very steep, except that the slope range is from 20 to 40 percent. Drainage is good to somewhat excessive. Runoff is medium and the erosion hazard is moderate. Capability unit VIe–6.

Sheridan coarse sandy loam, moderately steep (ShD).—Except for a range of slope from 11 to 20 percent, this soil is similar to Sheridan coarse sandy loam, very steep. Drainage is good. Runoff is slow to medium, and the erosion hazard is slight to moderate. Workability is rather difficult.

This soil is forested and is used as watershed. Capability unit IVe–6.

Soquel series

The Soquel series consists of nearly level to gently sloping, dark-colored soils that were formed in alluvium derived partly from sedimentary rocks and partly from

the Hugo, Santa Lucia, and related upland soils. Most of the soils are now cultivated, but a few small areas are still covered by redwood, oak, madrone, and an understory of grasses and shrubs. Willows and other water-loving plants grow along the banks of streams. Drainage is generally good. The Soquel soils occur along most of the drainageways from Half Moon Bay south to the county line. They are at elevations ranging from near sea level to about 100 feet. They are associated with the Corralitos, Coquille, and Farallone soils. The annual rainfall is about 25 inches.

The surface soil is very dark gray, slightly hard when dry, neutral, weakly granular loam. The subsoil typically is similar in texture, but it is somewhat stratified in places and ranges from fine sandy loam to light clay loam. The subsoil is slightly lighter colored than the surface soil, and in most places it is hard and massive. The subsoil is underlain by a moderately coarse textured substratum, or by older soil material, some of which is moderately fine textured. Some areas are imperfectly drained; a few are poorly drained.

The Soquel soils are among the most valuable agricultural soils in the Area. They are highly productive of a wide variety of crops, including artichokes, brussels sprouts, and flowers. Some areas are used for pasture.

Soquel loam, nearly level (SkA).—This soil occurs along flood plains in a slightly higher position than the Corralitos soils; as a consequence, it is not subject to so much deposition or streambank cutting. Slope ranges from 0 to 2 percent, but in most places it is less than 1 percent.

The soil is easy to work. It has a high water-holding capacity and is moderately permeable. Drainage is good. Runoff is very slow, and the erosion hazard is none to slight, although damage from streambank cutting may occur. The effective depth of root penetration is very deep.

This soil is very important agriculturally. It is high in fertility, and yields are high. A wide variety of crops is grown, including brussels sprouts, artichokes, and flowers. No conservation practices, other than good soil management, are needed. Capability unit I–1.

Soquel loam, gently sloping (SkB).—This soil is similar to Soquel loam, nearly level, except for stronger slope. The range of slope is from 2 to 6 percent. Runoff is very slow to slow, and the erosion hazard is slight.

The soil is intensively used for the production of truck crops, flowers, and pasture. If the soil is fertilized, yields are high. Cross-slope cultural practices should be used to reduce erosion. Capability unit IIe–1.

Soquel loam, sloping, eroded (SkC2).—This soil is similar is Soquel loam, nearly level, except that the range of slope is from 7 to 16 percent. The soil occurs in many small areas, some of which are only 1 acre in size. A few areas steeper than 16 percent are included. Runoff is slow to medium, and the erosion hazard is slight to moderate.

This soil is used for truck crops, flowers, and pasture. Cross-slope cultivation, diversion ditches, and other erosion-control practices are needed. If properly managed, this soil can be expected to produce fair to high yields. Fertilization is needed for best results. Capability unit IIIe–1.

Soquel loam, over clay, nearly level (SoA).—This soil, which occurs near Pescadero, is one of the best agricultural soils in the county. The loam surface layer is 12 to 36 inches thick, and it lies over finer textured material that extends to depths of many feet. There are a few mottles in the clay subsoil. Slope ranges from 0 to 2 percent, but the average slope is nearly 1 percent.

Permeability is moderate in the surface soil and moderately slow in the subsoil. The effective rooting depth is deep.

The soil is used intensively for the production of most truck crops grown in the Area, and some flower crops. Yields are high, and large quantities of fertilizer are used. Capability unit I–1.

Soquel loam, over clay, nearly level, poorly drained (SrA).—This soil is similar to Soquel loam, over clay, nearly level, except that it is poorly drained. It occurs at low elevations near the tidal marsh. The soil is sometimes flooded by ocean water and may be slightly saline.

This soil has a high productive potential, but it must be drained for best yields. When this is done, fair to high yields may be expected. Capability unit IIIw–2.

Soquel loam, over clay, nearly level, imperfectly drained (SsA).—This inextensive soil is similar to Soquel loam, over clay, nearly level, except for an occasional high water table. The soil occurs near the marshland west of Pescadero.

Most of this soil has been drained and is presently being used for truck crops, including artichokes and brussels sprouts. Capability unit IIw–2.

Soquel loam, nearly level, imperfectly drained (SmA).—The soil is similar to Soquel loam, nearly level, except for an occasional high water table and wet spots. Fresh alluvium is sometimes deposited by high water.

The soil is cultivated to truck crops and flowers, and part of it is pastured. If fertilizer is added, yields are high. Some drainage practices are needed. Capability unit IIw–2.

Soquel loam, gently sloping, poorly drained (SpB).—This soil is similar to Soquel loam, nearly level, imperfectly drained, except that it is poorly drained and slope ranges from 3 to 6 percent. Runoff is slow, and there is a slight erosion hazard. The soil occurs in small upland valleys where seepage is a major problem and water disposal is difficult. To make the best use of the soil, drainage should be provided to intercept the seepage water. Fair to high yields can be obtained if this is done. In addition, cross-slope cultural operations should be used. Capability unit IIIw–2.

Stabilized dune land

Stabilized dune land (Sd).—This miscellaneous land type consists of loose sand that has been stabilized by vegetation. Areas of this land type occur near Ano Nuevo Point and Pigeon Point. They have no agricultural value. Capability unit VIIIe–1.

Sweeney series

The Sweeney series consists of sloping to very steep soils that are well drained to somewhat excessively drained. The soils formed in place on uplands, from weathered, basic igneous rocks, principally diabase and basalt. The vegetation is annual grasses and a few oaks. The Sweeney soils are in the Coast Range at elevations usually above 1,000 feet. The largest areas are in the vicinity of Mindego and Langley Hills. These soils are

associated mainly with Butano and Mindego soils, but also with most of the other upland soils of the Area. The annual rainfall is 30 to 40 inches.

The surface soil, which in some places is stony, ranges in texture from loam to clay. It is dark grayish brown to very dark gray, slightly acid, hard when dry, and granular. The subsoil is very hard, neutral to slightly acid, and predominantly subangular blocky. In general, the subsoil is finer textured than the surface soil, but the clay content varies from place to place. Bedrock is most commonly between 36 and 60 inches. There are rock outcrops in many of the shallower areas, and weathered basalt cobbles and stones may be present in any part of the profile.

The Sweeney soils are used mainly as range for beef cattle and for watershed. Some of the more gently sloping areas are cultivated, and small grains, grain hay, and flax are grown.

Sweeney clay loam, moderately steep, eroded (SwD2).—The slope of this soil ranges from 15 to 30 percent. In about half the areas, there are a few gullies, and about 10 percent of the soil is affected by seeps. Runoff is medium, the erosion hazard is moderate, and permeability is moderately slow. The effective depth of root penetration is deep. The soil has a high water-holding capacity and is high in fertility. It is difficult to work.

This soil is used mainly as range for beef cattle; yields of forage are high. A few areas are used for dry-farmed grain and grain hay. Capability unit IVe–5.

Sweeney clay loam, sloping, eroded (SwC2).—Except that the range of slope is from 7 to 15 percent, this soil is similar to Sweeney clay loam, moderately steep, eroded. Runoff is slow to medium, and the erosion hazard is slight to moderate. Workability is rather difficult.

Some of this soil is used for dry-farmed grain, grain hay, and range. Yields are moderate to high. Capability unit IIIe–1.

Sweeney clay loam, steep, eroded (SwE2).—This soil is similar to Sweeney clay loam, moderately steep, eroded, except that range of slope is from 30 to 45 percent. Some small areas have a surface layer of clay texture, and in some places there are rocky spots. Runoff is rapid and the erosion hazard is high.

This soil is used principally for grazing beef cattle. Production of forage is high. Capability unit VIe–5.

Sweeney clay loam, very steep, eroded (SwF2).—This soil is similar to Sweeney clay loam, moderately steep, eroded, except that the slope is 45 percent or steeper. There are rock outcrops in a few places. Runoff is very rapid, and there is a very high erosion hazard.

This soil is used only for range. Capability unit VIIe–5.

Sweeney clay loam, steep and very steep, severely eroded (SwF3).—This soil has a slope of 41 percent or more and has been severely eroded; gullies are common in all the areas mapped. In other respects, it is similar to Sweeney clay loam, moderately steep, eroded. Runoff is very rapid, and the hazard of further erosion is very high. Capability unit VIIe–5.

Sweeney clay loam, deep, sloping, eroded (SxC2).—This soil is similar to Sweeney clay loam, moderately steep, eroded, except that it is deeper and the slope ranges from 7 to 15 percent. In some places the surface layer is loam. This soil occurs in basinlike or colluvial positions in the uplands, and it has more subsoil development than typical for the Sweeney series. Runoff is slow to medium, and the erosion hazard is slight to moderate. Workability is rather difficult.

Most areas of this soil are used for grazing by beef cattle. Some areas are used for dry-farmed grain and grain hay. Yields are moderate to high. Capability unit IIIe–1.

Sweeney clay loam, deep, moderately steep, eroded (SxD2).—This soil is similar to Sweeney clay loam, moderately steep, eroded, except that it is deeper and about half the areas are only slightly eroded. The two soils have the same use. Capability unit IVe–5.

Sweeney stony clay loam, moderately steep, eroded (SzD2).—This soil is similar to Sweeney clay loam, moderately steep, eroded, except for the presence of stones and rock outcrops. The mapping unit includes some small areas of stony loam and stony clay and a small area in which the slope is less than 15 percent. About one-third of the area is affected by seeps and springs. Runoff is medium and the erosion hazard is moderate.

This soil is used only for range. Capability unit IVe–5.

Sweeney stony clay loam, steep, eroded (SzE2).—Except for stones and numerous rock outcrops, this soil is similar to Sweeney clay loam, steep, eroded. Some areas are affected by seeps and springs. Capability unit VIe–5.

Sweeney stony clay loam, very steep, eroded (SzF2).—This is the most extensive mapping unit of the series; it occupies about 1,000 acres. It is similar to Sweeney clay loam, very steep, eroded, except for the stones and rock outcrops. Capability unit VIIe–5.

Sweeney clay, sloping (StC).—The surface layer of this soil is clay, which upon drying forms a blocky (adobe) structure. Slope is mostly between 7 and 15 percent. Runoff is slow to medium and the erosion hazard is slight. The water-holding capacity is high, and the effective depth of root penetration is moderately deep to deep. The soil is slowly permeable, has moderate fertility, and is difficult to work.

This soil is used for dry-farmed grain, grain hay, and range. Capabiliity unit IIIe–1.

Sweeney clay, moderately steep, eroded (StD2).—Erosion has thinned the surface layer and range of slope is from 15 to 30 percent, but this soil is otherwise similar to Sweeney clay, sloping. The soils are used the same. Runoff is medium and the erosion hazard is moderate. Capability unit IVe–5.

Sweeney loam, sloping, eroded (SyC2).—This soil and other Sweeney soils that have a surface layer of loam occur in one area along the Skyline Ridge. A variation in the parent material caused the formation of a soil coarser in texture than the normal soils of the Sweeney series. Except for the texture of the surface layer and slope that ranges from 7 to 15 percent, this soil is similar to Sweeney clay loam, moderately steep, eroded. The surface layer is moderately permeable. Runoff is slow to medium, and there is a slight to moderate erosion hazard. Workability is rather difficult.

This soil is used primarily for the grazing of beef cattle, although some grain and grain hay are grown. Capability unit IIIe–1.

Sweeney loam, moderately steep, eroded (SyD2).—Except for slope that ranges from 15 to 30 percent, this soil is similar to Sweeney loam, sloping, eroded, and the two

soils are used the same. There is a moderate erosion hazard, and workability is difficult. Capability unit IVe–5.

Sweeney loam, steep, eroded (SyE2).—Slope ranges from 30 to 45 percent, and in some places there are rock outcrops, but this soil is otherwise similar to Sweeney loam, sloping, eroded. Runoff is rapid and the erosion hazard is high. Workability is difficult.

This soil is used principally for grazing. Yields of forage are high. Capability unit VIe–5.

Sweeney loam, very steep, eroded (SyF2).—This soil is similar to Sweeney loam, sloping, eroded, but the subsoil contains less clay, and the slope is 45 percent or steeper. There are a few gullies in about three-fourths of the areas mapped. Runoff is very rapid, and the erosion hazard is very high.

This soil is used for watershed and for grazing by beef cattle. Capability unit VIIe–5.

Terrace escarpments

Terrace escarpments (Ta).—This miscellaneous land type includes the precipitous cliffs and slides immediately adjacent to the ocean. They consist mainly of the old marine sediments that make up the coastal terraces. These escarpments are scattered along the coastline, throughout the length of the survey area. Capability unit VIIIe–1.

Tierra series

The soils of the Tierra series have a claypan subsoil that is underlain by very hard material of the old terraces. The soils are moderately well drained to imperfectly drained. They are on sloping to steep uplands at elevations of about 100 to 300 feet, principally between Half Moon Bay and the southern tip of the Area. A few small areas are north of Half Moon Bay near El Granada and Moss Beach.

Nearly all of the soils are within a mile or so of the coast. They have formed in alluvium of mixed origin. The alluvium came chiefly from sedimentary rocks (fig. 21), although igneous rocks may also have contributed to it; north of Half Moon Bay some of the sediments are from granite. In a few places south of Half Moon Bay, the parent materials are very old sediments similar to those from which the Colma soils are derived. The vegetation consists mainly of coyotebrush and annual grasses and includes some herbaceous plants, such as plantain. The annual rainfall is 20 to 35 inches. Because Tierra soils are extensive, they are associated with a large number of the soils in the area.

Figure 21.—**Soft Quaternary marine sediments over older, more dense Purisima sediments The soil is Tierra sandy loam. Outcrops of Colma soils.**

The surface soil is very dark gray, slightly hard when dry, weak, granular sandy loam or loam. The lower part of this layer is dark gray and strongly leached. The subsoil is dark grayish-brown to light olive-brown, prismatic to blocky, heavy clay loam to sandy clay that is extremely hard when dry and very sticky and very plastic when wet. The surface soil is strongly acid; the lower subsoil is slightly acid or neutral. The parent material is finely mottled light brownish-gray and yellowish-brown,very hard, almost massive sandy clay loam.

Tierra soils are used principally for flax, small grain, and grain hay. These crops are rotated to some degree with range use. Very few areas are irrigated, and few truck crops are grown. Many of the Tierra soils are so eroded (fig. 22) that growing crops is not profitable, and these areas are used only for range. Much of the erosion damage took place while early spring peas were being grown for a profitable market. Where the slope is not too steep, Tierra soils are well suited to range grasses and legumes.

Tierra loam, moderately steep, eroded (TeD2).—This soil occupies ridgetops and a few of the sidehills. Slope ranges from 11 to 21 percent. Depth to the claypan averages 20 inches, but in places the claypan is within 10 inches of the surface. In about half the acreage, there are a few gullies, some of which are deep. A few wet spots and seeps in low areas occupy about 60 acres.

Runoff is slow to medium and the erosion hazard is high. Permeability is moderate in the surface soil but very slow in the subsoil. The effective depth of root penetration is shallow to moderately deep. The water-holding capacity and natural fertility are low, and the soil is rather difficult to work.

Most of the soil is farmed, and some is used for grazing. Flax, barley, oats, and hay are grown. Yields are fair to low depending principally on the intensity of use. The soil is not suited to continuous farming but should be under a cover of vegetation most of the time. Pastures can be improved by using suitable grasses and legumes. Intensive practices are needed when the soil is farmed. These include cross-slope cultivation, diversion ditches, and utilization of all crop residues. A few minor drains may be needed where water disposal is a problem. Capability unit IVe–3.

Tierra loam, gently sloping (TeB).—This soil is similar to Tierra loam, moderately steep, eroded, but the range of slope is from 2 to 5 percent, and the depth to the claypan is slightly greater as a result of less erosion of surface soil. There are a few, small seepage spots, but these do not interfere with cultivation. Runoff is very slow to slow, and the erosion hazard is slight. Under cultivation, however, the infiltration rate may be reduced by the tendency of the soil to puddle and seal when it is wet. The soil is easy to work.

Flax, grain, and grain hay are grown. Yields are only fair. Cross-slope cultivation and utilization of crop

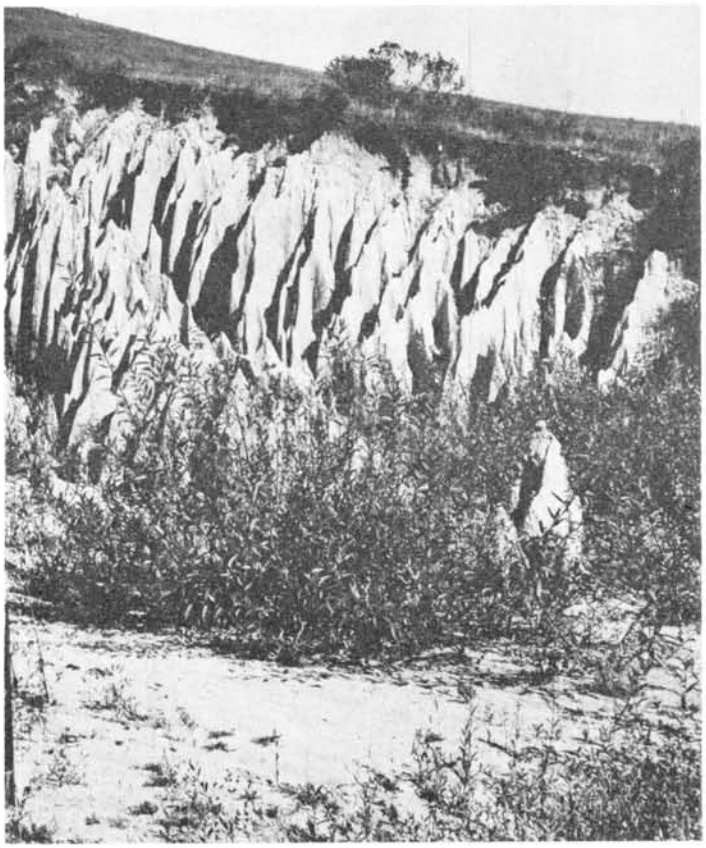


Figure 22.—**Gullies are formed readily in Tierra soils if runoff is not controlled.**

residues will help protect this soil from erosion. Capability unit IIIs–3.

Tierra loam, sloping, eroded (TeC2).—Except for the slope, which ranges from 5 to 11 percent, this soil is similar to Tierra loam, moderately steep, eroded. It is principally on ridgetops and on a few swales, saddles, and sidehill benches. Part of this soil is north of Half Moon Bay. About 25 percent is only slightly eroded. A few seeps are present, but they are not extensive. Runoff is slow, and the erosion hazard is moderate. The soil is fairly easy to work.

Most of this soil is used for dry-farmed crops, such as flax, oats, barley, and grain hay. Cross-slope cultivation, diversion ditches, and the use of all crop residues are advisable. A few minor drains are needed in some of the areas affected by seeps. Some gully-control practices should also be followed. Capability unit IIIe–3.

Tierra loam, steep, severely eroded (TeE3).—This soil is very much like Tierra loam, moderately steep, severely eroded, except that the range of slope is from 21 to 41 percent. A large area occurs north of Half Moon Bay, but most of the soil is south or east of that town.

Because of low crop yields and severe erosion, much of the soil is abandoned or is now used only for grazing (fig. 23). When it is used for grazing, careful management practices should be followed. Establishment of perennial cover is advisable. Capability unit VIIe–3.

Tierra loam, steep, eroded (TeE2).—This soil is on sidehills. Except for slope, which ranges from 21 to 41 percent, it is similar to Tierra loam, moderately steep, eroded. In some places the surface soil is clay loam; in others it is sandy loam. The soil has been eroded, and shallow gullies are present in about 75 percent of the acreage. Some of the gullies are very deep. A rather large acreage of this soil is north of Half Moon Bay, and in much of that acreage the soil contains gritty material from the granitic alluvium. Runoff is very rapid, and the erosion hazard is very high. The soil is difficult to work.

Much of this soil is farmed to flax, grain, and grain hay, but it is best suited to grazing. Improved grasses and legumes can be grown, and moderately intensive range management practices should then be followed. Capability VIe–3.

Tierra loam, moderately steep, severely eroded (TeD3).—This soil in most places has lost nearly all of its original surface soil because of severe sheet and gully erosion. In many places the subsoil is exposed, or it has been mixed with what remains of the original surface soil. Consequently, the surface layer is slightly finer textured than that of the normal Tierra soils. The soil ranges from 0 to 20 inches in depth to the claypan, but in most places the depth is 10 inches or less. Slope ranges from 11 to 21 percent.

Runoff is rapid and the erosion hazard is high. Permeability of the upper part of the profile is moderate to moderately slow, depending on how much of the original surface soil remains. The claypan is very slowly permeable, and the effective depth of root penetration is very shallow to shallow. The soil is very low in fertility and in water-holding capacity. Workability is difficult.

Many areas of this soil are out of cultivation because it is no longer profitable to farm them, and the soil should not be cultivated except to establish perennial cover. Control of gullies should include fencing to keep out livestock, and diversions to prevent the water from flowing down the gully channels. Capability unit VIe–3.

Tierra sandy loam, sloping, eroded (TmC2).—This soil is principally on ridgetops and on some sidehill benches. The profile is similar to that of Tierra loam, moderately

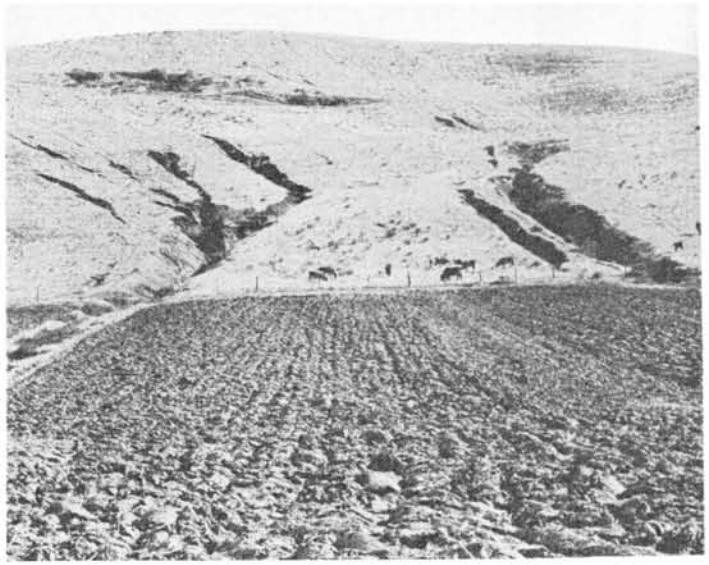


Figure 23.—**Deep gullies in an area of Tierra loam that has not been protected from erosion.**

steep, eroded, except that the surface layer is sandy loam. Slope ranges from 5 to 11 percent; a small area of 2 to 5 percent is included. Permeability is moderately rapid in the surface soil. Runoff is slow and the erosion hazard is moderate. Workability is fairly easy.

The soil is used principally for dryfarming and for range. When cultivated, it is used for growing flax, grain, and grain hay. Yields are only fair and are likely to be low where the soil is cropped continuously. Erosion-control measures, such as cross-slope cultivation and diversions, are advisable. Capability unit IIIe–3.

Tierra sandy loam, moderately steep, eroded (TmD2).—This soil is similar to Tierra sandy loam, sloping, eroded, except that the range of slope is from 11 to 21 percent. Runoff is slow to medium, and the erosion hazard is high (fig. 24). The soil is rather difficult to work.

A considerable amount of this soil is farmed to flax, grain, and grain hay. Yields are low. Because of the moderately steep slope, the soil should not be farmed continuously but should remain under cover most of the time. When it is farmed, cross-slope cultivation, diversions, and utilization of crop residues are advisable. The soil is best suited to improved pastures of grasses and legumes. Capability unit IVe–3.

Tierra clay loam, sloping, eroded (TcC2).—This soil is on hilltops and on sloping sidehills and benches. It is similar to Tierra loam, moderately steep, eroded, except for having a finer textured surface soil and slope of 5 to 11 percent. Runoff is slow to medium, and the erosion hazard is slight to moderate. Permeability is moderately slow in the surface soil and very slow in the subsoil.

This soil is used for flax, grain, grain hay, and range. Most areas are too small to be managed separately; consequently, they are used and managed like adjacent soils. Cross-slope cultivation, diversions, and the use of crop residues will help control erosion. A cover of plants is needed, particularly during the winter months, as protection against rain. Capability unit IIIe–3.

Tierra clay loam, moderately steep, eroded (TcD2).—This soil is similar to Tierra clay loam, sloping, eroded, except for slope of 11 to 20 percent. It is on moderately steep ridgetops and sidehills. Runoff is medium, and the erosion hazard is moderate to high.

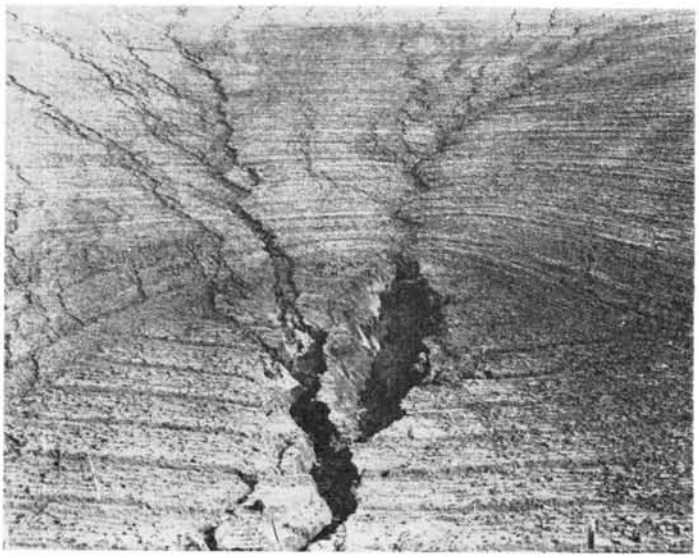


Figure 24.—**A gully is beginning on this field of Tierra sandy loam.**

The soil is used for flax, grain, grain hay, and range. In the past it was used for early spring peas. Cross-slope cultivation, diversion ditches, and mulch tillage will help control erosion.

The soil is well suited to improved varieties of grasses and legumes. Capability unit IVe–3.

Tierra sandy loam, acid variant, gently sloping (TsB).—This soil is on the highest level of the old marine terraces. Its location conforms closely to that of the underlying Chico geologic formation, which is exposed in places. Slope ranges from 2 to 5 percent. A representative profile differs from the normal one of Tierra soils principally because it is strongly acid throughout and has yellowish-brown rather than dark grayish-brown or olive-brown subsoil.

This soil is generally moderately well drained with the exception of a few low spots. Runoff is slow and the erosion hazard is slight. Permeability is rapid in the surface soil and very slow in the subsoil. The effective depth of root penetration is moderately deep. The water-holding capacity and fertility are low.

This soil is easy to work. It is used for flax and grain, and yields are fair to low. Crop rotations and cross-slope cultivation are advisable to reduce erosion. Capability unit IIIs–3.

Tierra sandy loam, acid variant, sloping, eroded (TsC2).—Except for slope of 5 to 11 percent and a thinner surface soil because of erosion, this soil is similar to Tierra sandy loam, acid variant, gently sloping. A few gullies and small seeps are present here and there. Runoff is slow to medium, and the erosion hazard is slight to moderate. The effective depth of root penetration is shallow to moderately deep.

This soil is fairly easy to work. It is used almost entirely for flax, grain, and hay. Yields are fair to low. Crop rotations, cross-slope cultivation, and diversion ditches will help control erosion. Capability unit IIIe–3.

Tierra sandy loam, acid variant, moderately steep, eroded (TsD2).—Except for the effects of moderate erosion and slope of 11 to 21 percent, this soil is similar to Tierra sandy loam, acid variant, gently sloping. There are a few gullies. Runoff is medium, and the erosion hazard is moderate to high. The effective depth of root penetration is shallow to moderately deep.

The soil is rather difficult to work. It is used for flax, grain, and hay. Yields are fair to low. Crop rotations, cross-slope cultivation, and diversion ditches are advisable to control erosion. Because of the moderately steep slopes, this soil should not be cultivated continuously. The soil is well suited to improved grasses and legumes. Capability unit IVe–3.

Tierra sandy loam, acid variant, steep, severely eroded (TsE3).—Erosion has removed most of the original surface layer of this soil, and gullies, some of them deep enough to interfere with cultivation, are common. In most places the original subsoil is exposed or has been mixed by tillage with what remains of the original surface soil. These areas have a finer textured, lighter colored, and more yellowish-brown surface soil than those where there has been less erosion. Slope ranges from 21 to 41

percent, although smaller areas of moderately steep soils are included.

Runoff is very rapid, and the erosion hazard is very high. The soil has very low water-holding capacity and low fertility. Permeability is moderate in the surface soil and very slow in the subsoil. The effective depth of root penetration is shallow.

This soil is difficult to work, and most areas are used only for range. Intensive erosion-control practices are needed to prevent further erosion and to protect lower lying areas from deposition. Capability unit VIe–3.

Tunitas series

The Tunitas series consists of moderately well drained to imperfectly drained, nearly level to moderately steep soils that have formed in alluvium from sandstone, shale, and some basic igneous rocks. The vegetation on them is mainly grass, coyotebrush, and willows; some brush and herbs grow along the drainageways. The Tunitas soils are on fans or flood plains along some of the major drainageways between Half Moon Bay and Pescadero at elevations of about 50 to 150 feet. They are associated with the lower lying soils of the Corralitos, Soquel, and Botella series and with upland soils of the Gazos, Lobitos, Watsonville, and Tierra series. The annual rainfall is about 25 inches.

The surface soil is very dark gray, medium acid, very hard when dry, granular loam or clay loam. The subsoil is very dark gray, extremely hard, subangular blocky clay. The upper subsoil is slightly acid, and the lower subsoil is mildly alkaline.

The Tunitas soils are used principally for truck crops and for irrigated pasture. A few small areas are dry-farmed or used for range. The principal truck crops are artichokes and brussels sprouts. Field crops include flax, small grains, and grain hay. A few wet spots are not cultivated.

Tunitas clay loam, sloping, eroded (TuC2).—The slope of this moderately well drained soil ranges from 5 to 11 percent. Many areas have seeps, and excess water collects in swales and interferes with the operation of farm implements.

Permeability is moderately slow in the surface soil and slow in the subsoil. The effective depth of root penetration is moderately deep to deep. The soil has good water-holding capacity and moderate fertility. It is rather difficult to work. Runoff is slow to medium, and the erosion hazard is slight to moderate.

This soil is used for truck crops, flax, grain, grain hay, irrigated pasture, and, to some extent, for range. To maintain high yields, nitrogen fertilizer is needed. Cross-slope cultivation, diversion ditches, utilization of crop residues, and careful management of irrigation water will reduce erosion. Capability unit IIIe–3.

Tunitas clay loam, nearly level (TuA).—This soil is similar to Tunitas clay loam, sloping, eroded, except that the slope ranges from 0 to 2 percent and there has been little or no erosion. Runoff is very slow, and the erosion hazard is none or slight. Workability is fairly easy. Water-holding capacity is good to high.

This soil is used for truck crops, including artichokes and brussels sprouts, occasionally rotated with flax, grain, or dry-farmed crops. To prevent waterlogging, irrigation should be carefully controlled. Capability unit IIs–3.

Tunitas clay loam, gently sloping (TuB).—Except for slope, which ranges from 2 to 5 percent, and less thinning of the surface soil by erosion, this soil is similar to Tunitas clay loam, sloping, eroded. Runoff is slow and the erosion hazard is slight. Workability is fairly easy.

This soil is important in farming and is used for brussels sprouts and artichokes. Some areas are dry-farmed to flax, grain, and grain hay. A small area is grazed occasionally. Cross-slope tillage, diversions, and utilization of crop residues will help control erosion. Capability unit IIs–3.

Tunitas clay loam, moderately steep, eroded (TuD2).—This soil is similar to Tunitas clay loam, sloping, eroded, but slopes range from 11 to 21 percent. Runoff is medium, although in almost half the areas water tends to accumulate in the low swales and is difficult to dispose of. The erosion hazard is moderate.

The soil is difficult to work. It is used principally for dry-farmed flax and grain but also for irrigated pasture and for range. Improved dryland range grasses and legumes are well suited. Because of the slope, the soil should be covered with vegetation most of the time. Capability unit IVe–3.

Tunitas clay loam, nearly level, imperfectly drained (TwA).—This soil is similar to Tunitas clay loam, nearly level, except that it is imperfectly drained. Seepage water and runoff water from higher lying areas frequently accumulates and is difficult to dispose of. A small area of poorly drained soil is included, and here the disposal of excess water is especially difficult. In a few places some deposition of alluvial soil material occurs from time to time.

This soil is used chiefly for brussels sprouts and artichokes. Yields are affected by the imperfect drainage. Drainage to remove the excess water and to intercept seepage from higher areas is advisable. When the soil is irrigated, a carefully controlled system is needed. Capability unit IIs–3.

Tunitas clay loam, gently sloping, imperfectly drained (TwB).—This soil is similar to Tunitas clay loam, gently sloping, except that it is imperfectly drained. In general, the problem of wetness is minor, but a few places are so wet that cultivation is not possible.

This soil is used for truck crops, flax, grain, grain hay, and, to some extent, for irrigated pasture. Drainage should be provided to remove the excess water in the wet spots so the soil can be farmed more uniformly. Capability unit IIs–3.

Tunitas loam, nearly level (TxA).—The slope of this soil ranges from 0 to 2 percent. The surface soil is moderately permeable; the subsoil is slowly permeable. Runoff is very slow, and excess water accumulates in depressions; the erosion hazard is none or slight. The water-holding capacity is good, fertility is moderate, and the soil is fairly easy to work. The effective depth of root penetration is moderately deep to deep.

This soil is used principally for truck crops and irrigated pasture. Irrigation should be controlled carefully to prevent waterlogging. Capability unit IIs–3.

Tunitas loam, gently sloping (TxB).—Except for slope of 2 to 5 percent, this soil is similar to Tunitas loam, nearly level. Runoff is slow and the erosion hazard is slight. In some of the areas of deeper soil, the water-

supplying and nutrient-supplying ability are somewhat higher than average.

The soil is used principally for brussels sprouts, artichokes, and irrigated pasture. In a few places it is dry-farmed or used as range. Cross-slope tillage and careful control of irrigation water are desirable. Capability unit IIs–3.

Tunitas loam, sloping, eroded (TxC2).—This soil is similar to Tunitas loam, nearly level, except for a moderate degree of erosion and slope of 5 to 11 percent. Runoff is slow to medium, the erosion hazard is slight to moderate, and workability is rather difficult.

The soil is used principally for truck crops and irrigated pasture. It is also used for flax, grain, grain hay, and, to a lesser extent, for range. Fertilizer, especially nitrogen, is needed for best results. The principal erosion-control measures that apply are cross-slope cultivation, diversion ditches, and mulch tillage. Capability unit IIIe–3.

Watsonville series

Watsonville soils have a dense claypan subsoil that is underlain by marine sediments. The soils are moderately well drained to imperfectly drained. They have formed in alluvium that was derived principally from sedimentary rocks and from higher lying upland soils. The Watsonville soils are on nearly level to steep terraces between Half Moon Bay and the southern tip of the Area. They are generally within a mile of the ocean. The largest areas are near Half Moon Bay. Because of their extent, they are associated with a great many other soils in the Area. The vegetation consists chiefly of coyotebrush and an understory of grasses and a few weeds, such as plantain. Elevation ranges from 25 to 150 feet. The average annual rainfall is about 25 inches.

The surface layer is dark gray, granular, slightly hard to hard when dry, and medium to strongly acid. The lower part is lighter gray and strongly leached. The texture of the surface soil normally is sandy loam, loam, or clay loam, although it is loamy sand in some places in the southern part of the Area. The subsoil is slightly to medium acid, very hard and dense, yellowish-brown, heavy sandy clay loam or sandy clay mottled in the lower part with light gray, light brownish gray, and grayish brown. The parent material consists of neutral, massive, very hard, somewhat stratified layers predominantly of sandy loam texture. A profile is shown in figure 25.

The Watsonville soils are used chiefly for brussels sprouts and other shallow-rooted truck crops and for dry-farmed flax, grain, and grain hay. A considerable acreage is used for irrigated pasture. The soils are not well suited to deep-rooted crops, such as artichokes, but are occasionally used for them.

Watsonville loam, sloping, eroded (WmC2).—This soil is shallow to moderately deep over the very slowly permeable claypan. Slope ranges from 5 to 11 percent. There are a few gullies in more than half the areas (fig. 26); in some places gullies are numerous and very deep. Near Purisima Creek there are a few small areas in which the surface soil is gravelly loam. Runoff is slow to medium, and the erosion hazard is slight to moderate. Permeability is moderate in the surface soil and very slow in the subsoil. The water-holding capacity and natural fertility are low. Workability is fairly easy.

Figure 25.—**Profile of Watsonville sandy loam. The gray, leached layer lies just above the dense claypan subsoil.**

The soil is used principally for growing dry-farmed crops, such as flax, grain, and grain hay. A few areas are used for brussels sprouts. Cross-slope cultivation and diversion ditches will protect the soil from erosion. Irrigation with sprinklers is advisable. Crop residues should be returned to the soil instead of being burned or otherwise removed. Capability unit IIIe–3.

Watsonville loam, gently sloping, eroded (WmB2).—Slope ranges from 2 to 5 percent, but this soil is otherwise similar to Watsonville loam, sloping, eroded. In a few small areas, the surface soil is gravelly. Runoff is slow, and the erosion hazard is slight to moderate.

This soil is used for truck crops, irrigated pasture, and dry-farmed flax, grain, and grain hay. Fertilizer is generally used on truck crops, and yields are fair to high. Cross-slope cultivation, diversions, and returning crop residues to the soil will help control erosion. To prevent waterlogging the soil, and because the surface tends to seal when it becomes wet, care is needed in irrigation. When the soil dries, a crust forms on the surface, in some places so hard the seedlings cannot get through it. Capability unit IIIs–3.

Watsonville loam, moderately steep, eroded (WmD2).—This soil is similar to Watsonville loam, sloping, eroded, except that slope ranges from 11 to 21 percent. One small area has a surface soil of gravelly loam. Runoff is medium and the erosion hazard is high.

This soil is used principally for growing flax, grain, and grain hay. It should not be farmed continuously;

Figure 26.—**Gully in Watsonville loam. Tierra soils in background.**

it is best suited to permanent cover, such as improved species of range grasses and legumes. If the soil is cultivated, erosion-control measures are needed. Capability unit IVe–3.

Watsonville loam, nearly level (WmA).—This soil is similar to Watsonville loam, sloping, eroded, except that slope is from 0 to 2 percent. The topography is slightly undulating, and the surface has a slight hogwallow appearance. Water collects in the depressions, and these areas remain wet for a long time in spring. Runoff is very slow, and the erosion hazard is none or slight. The soil is easy to work. It is used for brussels sprouts and other vegetables and for dryfarming to flax, grain, and grain hay. Irrigation water must be controlled carefully, and fertilizer is needed for best yields of truck crops. Capability unit IIIs–3.

Watsonville loam, gently sloping (WmB).—This soil is principally in the vicinity of Half Moon Bay. It is similar to Watsonville loam, sloping, eroded, except that the depth to the claypan is slightly greater and slope ranges from 2 to 5 percent. Runoff is slow and the erosion hazard is slight. On the surface in some places there are fresh deposits of soil eroded from higher areas. There are a few low spots where water collects and remains long enough to delay fieldwork, after fieldwork can be done on the higher land.

This soil is used for truck crops, irrigated pasture, and dry-farmed crops, such as flax, grain, and grain hay. Capability unit IIIs–3.

Watsonville loam, sloping, severely eroded (WmC3).—A small area of this soil is located a few miles south of Half Moon Bay. Erosion has removed so much of the original soil that the claypan is closer to the surface than in Watsonville loam, sloping, eroded. In many places the claypan is exposed or has been mixed with what remains of the original surface soil to give a surface soil of heavy loam or sandy clay loam. Gullies are numerous. Slope ranges from 2 to 11 percent. Runoff is slow to medium and the erosion hazard is high. Roots penetrate only to a shallow depth. The soil has very low water-holding capacity and is difficult to work. Natural fertility is very low.

The soil is now used less intensively than in the past. It is best suited to permanent vegetation. Capability unit IVe–3.

Watsonville loam, moderately steep and steep, severely eroded (WmE3).—This soil has been so severely

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eroded that the subsoil is exposed or is very close to the surface in much of the acreage. In places the surface soil contains former subsoil that has been mixed with it by tillage and the texture of the upper few inches is sandy clay or sandy clay loam. Gullies, some of them very deep, are numerous. Slope ranges from 11 to 40 percent. Permeability of the surface layer is moderately slow. The soil has a very low water-holding capacity and is difficult to work. Root penetration is very shallow. Runoff is very rapid, and the erosion hazard is very high. Natural fertility is very low.

Because cultivation no longer gives profitable returns, little of this soil is cultivated. The soil is best suited to permanent vegetation. A good cover of plants will reduce erosion and also will protect lower lying, nearby areas from deposition. Capability unit VIe–3.

Watsonville loam, nearly level, poorly drained (WnA).—Except for being poorly drained, this soil is similar to Watsonville loam, nearly level. Runoff is ponded to very slow; water tends to collect in the depressions.

The soil is used for pasture and for some of the less intensively cultivated truck crops. The practice most needed is drainage to remove the excess water. In addition, some areas need protection from deposition that is the result of erosion of soils at higher levels. Capability unit IIIw–2.

Watsonville loam, gently sloping, poorly drained (WnB).—This soil is similar to Watsonville loam, nearly level, poorly drained, except that slope ranges from 2 to 5 percent. The soils are used the same. Runoff is very slow to slow, and there is a slight erosion hazard. Capability unit IIIw–2.

Watsonville clay loam, nearly level (WaA).—The main location of this soil is about 2½ miles south of Half Moon Bay. The soil is not extensive. It has formed partly because finer textured materials have been deposited over Watsonville loam and sandy loam. The surface soil is darker colored than that of the typical Watsonville soils. The soil is moderately deep to the very slowly permeable claypan. Slope ranges from 0 to 2 percent.

Runoff is very slow, and water tends to accumulate in low spots in a few places. The erosion hazard is none or slight. Permeability is moderately slow in the surface soil and very slow in the subsoil. The water-holding capacity is low to good, fertility is low, and workability is easy.

The soil is used chiefly for flax, grain, and grain hay. Most crops respond to nitrogen; winter crops and legumes respond to phosphorus in combination with nitrogen. Careful irrigation management is needed to prevent waterlogging the soil. Capability unit IIIs–3.

Watsonville clay loam, gently sloping (WaB).—This soil is similar to Watsonville clay loam, nearly level, but the slope ranges from 2 to 5 percent. Runoff is slow, and there is a slight erosion hazard.

The soil is used principally for flax, grain, and grain hay; a small acreage is irrigated. Yields are fair. Cross-slope farming, mulch tillage, and diversions are advisable to control erosion. Capability unit IIIs–3.

Watsonville clay loam, sloping, eroded (WaC2).—This soil is similar to Watsonville clay loam, nearly level, except that slope ranges from 5 to 11 percent and there has been more erosion. Runoff is slow to medium, and the erosion hazard is slight to moderate. The soil is fairly easy to work. It has the same uses as Watsonville clay loam, gently sloping, but more intensive erosion-control measures are needed, including cross-slope cultivation, diversions, utilization of crop residues, and mulch tillage. Capability unit IIIe–3.

Watsonville sandy loam, sloping, eroded (WsC2).—This soil is shallow to moderately deep to the very slowly permeable claypan. Slope ranges from 5 to 11 percent. A few areas have been only slightly eroded, but in most areas moderate sheet and gully erosion have occurred. There are seeps in places.

Permeability is rapid in the surface soil and very slow in the subsoil. Fertility and water-holding capacity are low. Runoff is slow to medium, and the erosion hazard is slight to moderate. Workability is fairly easy.

The soil has a wide variety of uses, including dryfarming to flax, grain, and grain hay, and some use for brussels sprouts and other truck crops. Fertilizer, especially nitrogen, is needed when the soil is used intensively. Cross-slope cultivation, diversion ditches, mulch tillage, and utilization of crop residues are advisable to control erosion. Residues from crops, such as flax and grain, should not be burned or removed. Irrigation should be controlled carefully. Capability unit IIIe–3.

Watsonville sandy loam, gently sloping, eroded (WsB2).—The slope of this soil ranges from 2 to 5 percent. Runoff is slow, and the erosion hazard is slight to moderate.

The soil is used principally for dry-farmed crops, such as flax, grain, and grain hay. Brussels sprouts, potatoes, and other truck crops are grown occasionally. When the soil is used intensively, fertilization is needed to increase yields. Cross-slope cultivation, diversions, and mulch tillage are advisable to control erosion. Careful irrigation is needed to reduce the accumulation of excess water. Capability unit IIIs–3.

Watsonville sandy loam, gently sloping (WsB).—This soil has a range in slope of 2 to 5 percent, and it has been eroded less than Watsonville sandy loam, sloping, eroded. The effective depth of root penetration is shallow to moderately deep. Runoff is slow and the erosion hazard is slight. This soil typically has some shallow, hogwallow depressions in which excess water often accumulates and is difficult to dispose of. Workability is easy.

The soil is used principally for dry-farmed crops, such as grain, grain hay, and flax. In a few places brussels sprouts and other truck crops are grown. Fertilizer is needed for brussels sprouts; cross-slope cultivation is needed to control erosion; and careful irrigation is needed to control the accumulation of excess water. Capability unit IIIs–3.

Watsonville sandy loam, moderately steep, eroded (WsD2).—This soil is similar to Watsonville sandy loam, sloping, eroded, except that the range of slope is from 11 to 21 percent. Runoff is medium and the erosion hazard is high. Workability is difficult.

The soil is used principally for flax, grain, and grain hay. Some areas are used for truck crops. The soil is best suited to perennial cover, such as improved grasses and legumes. Erosion-control measures, such as cross-slope cultivation, diversion ditches, and mulch tillage, are needed if the soil is cultivated. Capability unit IVe–3.

Watsonville sandy loam, thick surface, gently slop-

ing, eroded (WtB2).—This soil is similar to Watsonville sandy loam, gently sloping, except that it is considerably deeper to the claypan. Because this soil occurs in swale areas, deposits of soil washed from higher areas have accumulated on the surface. The effective depth of root penetration is moderately deep to deep, and the water-holding capacity is low to good.

The soil is used principally for dryfarming of flax, grain, and grain hay. Yields are fair. Capability unit IIIe–1.

Watsonville loamy sand, gently sloping, overblown (WoB).—A small acreage of this soil occurs in the southern part of the Area where some dune sand, blown onto the Watsonville soil, has been mixed by tillage with the original surface soil. The depth of the sand is variable, ranging from a few inches to many inches. In a few places the addition of windblown sand is continuing; in a few places seepage is a problem. Slope ranges from 2 to 11 percent.

Permeability is rapid in the surface soil and very slow in the subsoil. Runoff is very slow to slow, and there is a slight hazard from wind erosion. The effective depth of root penetration is shallow to moderately deep. The water-holding capacity and fertility are low, and workability is easy.

This soil is best suited to drought-tolerant crops. It should be protected from further encroachment of dune sand, and, where feasible, drainage should be provided to remove the excess seepage water. Capability unit IIIe–3.

Genesis and Classification of Soils [3]

In this section the factors that have affected the formation and composition of the soils in the San Mateo Area are discussed. Also discussed is the classification of the soils by higher categories.

[3] By JOHN E. MCCLELLAND, senior soil correlator, Soil Conservation Service.

Factors of Soil Formation

Soil has been defined as a natural body on the surface of the earth in which plants grow, composed of organic and mineral materials (*23*). Soils differ in their appearance, composition, productivity, and management requirements, in different localities or even within very short distances in the same locality. The factors that cause soils to differ are: (1) The physical and mineralogical composition of the parent material of the soil, (2) the climate under which the soil material has accumulated and existed since accumulation, (3) the plant and animal life in and on the soil, (4) the relief or lay of the land, and (5) the length of time the forces of development have acted on the soil material. Soil surveys are made to delineate on maps areas of soils whose properties vary within defined limits.

The individual mapping units of this soil survey have relatively narrow limits of variability in their characteristics and, hence, in the five soil-forming factors. Mapping units of the same soil series have many characteristics in common, but differ from one another chiefly in slope, in degree of past erosion, in the texture of the surface horizon, in depth of rooting zone, or in other ways. Under similar management the productivity of any mapping unit should be about the same throughout the survey area. This soil survey area contains 239 mapping units, which are members of 30 soil series and 8 land types. The members of each soil series have the same sequence of major horizons, but the thickness of each horizon and the physical and chemical properties of each may vary within specified limits.

Parent material

Soil materials are mainly those of dissected marine and alluvial terraces and narrow alluvial fans in the coastal section, and sandstone, shale, limestone, and various crystalline rocks in the foothills and mountains. There are a few sand dunes in the coastal section.

Geologic formations that furnished the mineral soil materials are described briefly in table 11. In the table

TABLE 11.—*The age, classification, and description of the geological deposits upon which the soils of southwestern San Mateo County survey area have developed (8, 24, 25)*

Geologic age	Formation	Type of rock
Recent	Terrace gravels; alluvium	Assortment of sand, gravel, silt, and clay.
Pleistocene to upper Miocene	Santa Clara	Unconsolidated continental gravel and clay.
Pleistocene to upper Miocene	Merced	Loosely consolidated marine sands; sandstone and shale; volcanic ash.
Pliocene to upper Miocene	Purisima	Mostly marine sandstone, siltstone, clay, shale, and gravel.
Miocene	Monterey	Marine deposits of diatomaceous and siliceous shale and sandstone. Lower heavy-bedded sandstone and coarse conglomerate; breccia; interbedded basalt and diabase with limestone inclusions.
Miocene	Vaqueros	
Oligocene	San Lorenzo	Marine sandstone and shale.
Upper Eocene	Butano	Massive, brown marine sandstone.
Paleocene	Martinez	Alternating sandstone and shale and sandstone and conglomerate.
Upper Cretaceous	Undifferentiated (Chico?)	Marine conglomerate, sandstone, siltstone, and some shale.
Upper Jurassic (?)	Franciscan-Knoxville group	Arkosic marine sandstone; graywacke, siltstone, and shale, local conglomerate, radiolarian chert, limestone, schists, serpentine, and ultrabasic intrusions.
Paleozoic	Montara quartz diorite; Gabilan limestone.	Biotite quartz diorite; a few lenses of older Gabilan (?) limestone.

the oldest formation is listed at the bottom and those more recent are listed above it in chronological order.

Figure 27 shows the relative extent of the major geologic formations in the Area (*24*, *25*), and figure 28, shows the relationship of the geologic formations, land forms, and soil series.

The following indicates the different kinds of parent material in the Area and lists the principal soil series formed from each:

Parent material:	*Soil series*
Unconsolidated alluvium from—	
Dominantly sedimentary rock sources	Botella, Corralitos, Dublin, Soquel, Watsonville.
Dominantly siliceous sedimentary rock sources.	Lockwood.
Dominantly granitic rock sources	Denison, Farralone.
Mixed rock sources	Baywood, Coquille, Elkhorn, Tunitas.
Igneous rocks—	
Quartz diorite	Miramar, Sheridan.
Basic igneous rocks—	
Principally basalt and diabase	Mindego, Sweeney.
Serpentine	Montara.
Sedimentary rocks—	
Limestone	Calera.
Siliceous shale	Butano, Santa Lucia.
Sandstone and shale	Cayucos, Gazos, Hugo, Josephine, Lobitos, Pomponio.
Metamorphosed (hard) sandstone and shale.	Hugo, Josephine Laughlin, Los Gatos.

The influence of parent material on soil is shown by the Watsonville series and by the Lockwood series, brown subsoil variant. The Watsonville soils near Half Moon Bay developed in marine sediments that were derived mainly from soft sandstone and shale of the Purisima and Vaqueros formations. The Watsonville soils are Planosols with moderately coarse or medium-textured A and C horizons and a dense, clayey B_2 horizon. In the southern part of the county at approximately the same elevation are terraces that appear to have been constructed in the same geologic period, from materials washed from hard siliceous shale of the Monterey formation. The soils on these siliceous materials are the brown subsoil variant of the Lockwood series. These soils are moderately developed Brunizems with a loam A horizon, a heavy clay loam B_2 horizon, and a clay loam C horizon. The Lockwood soils, brown subsoil variant, are strongly acid throughout, and the Watsonville soils are medium acid in the upper horizons and neutral below.

Lack of bases in the parent material of the Lockwood variant no doubt is responsible for both the lower clay content in the B_2 horizon and the strongly acid profile.

Climate

The climate of the Area is representative of that of the northern coast of California. Winters are mild and wet, and summers are cool and nearly rainless. The average annual rainfall is approximately 23 inches at Half Moon Bay, or about average for the immediate coastal strip. Precipitation is greater in those coastal areas where steep hills lie to the east. Farther east, rainfall is greater at higher altitudes, reaching a maximum average of about 45 inches on Montara Mountain and 50 inches near Portola State Park.

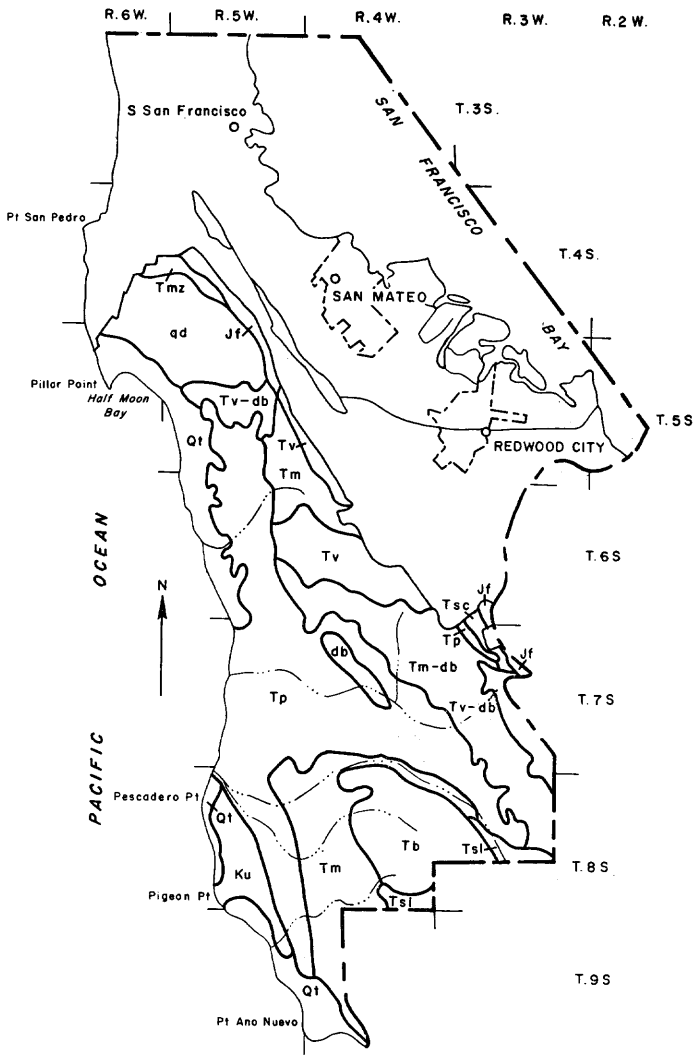

***Figure 27.*—Geologic map of the San Mateo Area. Formations are shown by the symbols *Qt*, Marine terraces and recent alluvium; *Tsc*, Santa Clara; *Tp*, Purisima; *Tm*, Monterey; *Tv*, Vaqueros; *Tsl*, San Lorenzo; *Tb*, Butano; *Tmz*, Martinez; *Ku*, undifferentiated; *Jf*, Franciscan-Knoxville group; *qd*, Montara quartz diorite and Gabilan limestone; and *db*, diabase intrusions.**

Temperatures are rather mild because the area is near the ocean. One or two killing frosts may occur each year. At Half Moon Bay the average January temperature is about 49° F., the average July temperature is 58° F., and the average annual temperature is 54° F. Many years are frost free.

Along the coast, fog in the morning is common in summer. Moisture from fogs is believed to be a major factor in the formation of the soils in this area that have a dark-gray surface horizon. Across the Divide in Santa Clara County and farther inland, browner soils have formed on similar materials. The fog reduces temperature, increases humidity, and probably supplies some moisture to the soil. As a result, the loss of moisture by

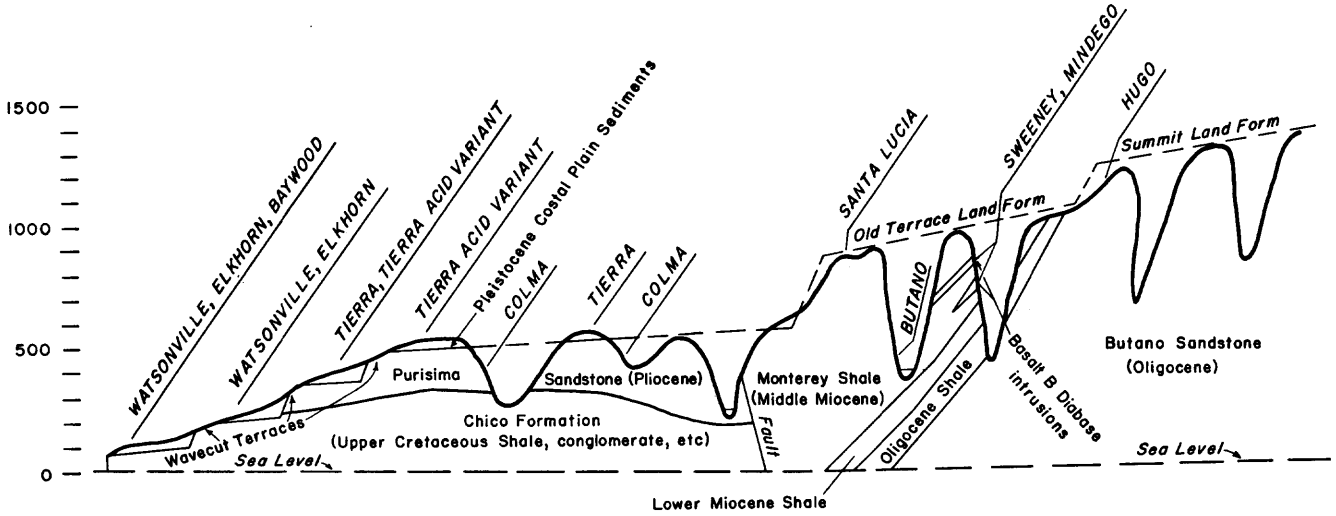

Figure 28.—**Southwest to northeast cross section, at Pigeon Point, showing relationship of geologic formations, land forms, and soil series. Prepared by R. J. Arkley, University of California, Department of Soils and Plant Nutritions.**

transpiration is reduced, effective rainfall is increased, and moisture does not become deficient so soon during dry summers as it does farther inland. Thus, more organic matter is produced and added to the soil here than in a drier climate.

Biological activity

In the San Mateo Area, vegetation has played a larger part than other living organisms in the development of the soils. The vegetation on the higher, mountainous areas is mostly coniferous forest of Douglas-fir and redwood with some areas of shrubs and hardwood trees, such as oak and madrone. Some grassland is located in the uplands near Langley and Mindego Hills. The draws, swales, and canyons of the uplands are generally forested. The north-facing slopes of the lower hills and terraces are mainly covered with shrubs, and the south-facing slopes, with shrubs and grasses. The nearly level or gently sloping areas are covered with grasses. The most prominent shrub is coyotebrush (*Baccharis pilularis*). The grasses are mostly annuals, such as soft chess, annual ryegrass, wild oats, and annual fescue. The ryegrass is the most extensive along the coast. Burclover and filaree are also extensive throughout the Area.

Relief

Elevations in the Area range from sea level to about 2,600 feet. A series of flat and rolling terraces extends along the coast. The terraces interfinger into the lower foothills, above which rise steeply sloping, rough mountains. The terraces, hills, and mountains are cut by many small streams, a few of which are perennial.

Three stream valleys of moderate size and importance are in the Area. They are the valleys of the Pilarcitos, San Gregorio, and Pescadero Creeks. These valleys contain deposits that date back to the time when the marine terraces were formed, and also recent alluvial deposits. A small amount of alluvium is currently being deposited from time to time along their lower reaches. Most of the other stream valleys are so narrow that only negligible amounts of recent alluvium are present.

A series of wave-cut terraces was developed adjacent to most of the coast. Many of the terraces are nearly level, but others are dissected, so the topography ranges from nearly level to hilly or steep. Nearly all of the arable land in the survey area is in stream valleys or on terraces, or alluvial fans.

Time

The soils in the survey area are of different ages. The time available for a soil to be developed on unconsolidated sediments is the time that has elapsed since final deposition of the parent material. Soils on the consolidated sediments and igneous rocks began to develop after the parent rocks weathered into permeable material.

The marine terraces of San Mateo County are probably of Pleistocene or more recent age. They probably were formed by uplift of the coastal area, by fluctuations in the sea level, or both. The unequal altitudes or terraces of the same age and some landward rather than seaward slopes indicate uplift as the major cause in forming the terraces. The lowest wave-cut terraces have distinct cliffs or escarpments along their seaward edge. Succeedingly higher, and presumably older, terraces have less distinct escarpments, commonly are more dissected, and tend to have more strongly developed soils. Elevations of the wave-cut terraces range from near sea level to about 500 feet above the sea. Most of the alluvial soils occur near the ocean, and changes in elevation of the coastal area undoubtedly were accompanied by uplift of older alluvial terraces and formation of new terraces.

For the most part, the rocks of the uplands are older than the Pleistocene. However, because of the steep and mountainous topography, it seems likely that the relative rate of erosion has been a major factor in accumulation of soil material and, hence, in age of the soils. Factors that affect erosion include the nature and density of the ground cover; the length and steepness of the slope;

the amount of water the soil can absorb and retain for a given time; and the frequency, amount, and distribution of rainfall. Soils on north-facing and east-facing slopes support denser vegetation than the warmer and, consequently, more arid south-facing and west-facing slopes. Presumably, because of less erosion and a more favorable moisture supply, the north-facing and east-facing slopes on similar parent rock and with similar steepness of slope have deeper, more strongly weathered, older soils. Soils on steep slopes, as a rule, are shallower and younger than soils on gentle slopes. The greater amount and intensity of rainfall and the steep slopes at high elevations permit rapid erosion. These factors help account for the shallow, weakly developed, and, therefore, young soils of the high places.

Classification of Soils

In the system of soil classification followed in the United States since 1938 (*23*), soils are classified in six categories. These are the order, suborder, great soil group, family, series, and type. This system, with later modifications, has been followed to place the soils of this Area in eight of the great soil groups. The modifications are those suggested by Thorp and Smith (*19*); Oakes and Thorp (*12*); Simonson, Riecken, and Smith (*17*); and Baur and Lyford (*4*).

The following lists the soil series in the San Mateo Area, classified by order and great soil group, and the estimated proportionate extent of each series:

	Percent
AZONAL ORDER:	
Regosols:	
Baywood	0.1
Corralitos	.4
Farallone	.5
Gazos	6.1
Laughlin	2.7
Sheridan	.9
Soquel	.5
Lithosols:	
Montara	.1
Santa Lucia	6.0
ZONAL ORDER:	
Brunizems (minimal):	
Botella	.6
Colma	2.6
Lobitos	9.3
Lockwood	.5
Los Gatos	.1
Sweeney	4.2
Brunizems (medial):	
Denison	.3
Elkhorn	1.1
Lockwood variant	.2
Mindego	2.6
Miramar	3.0
Tunitas	.7
Yellowish-Brown Lateritic soils:	
Butano	8.5
Josephine	(1)
Sols Bruns Acides:	
Hugo	[1] 26.5
INTRAZONAL ORDER:	
Planosols:	
Pomponio	1.9
Tierra	3.9
Tierra, acid variants	.6
Watsonville	3.3
Grumusols:	
Cayucos	2.0
Dublin	.5
Humic Gley soils:	
Coquille	.2
Rendzinas:	
Calera	.2

[1] Combined extent of Hugo and Josephine series, undifferentiated.

A representative profile of each soil series is described in detail in the section, Descriptions of Soil Profiles. Laboratory data on samples of each horizon in the profile of six soils belonging to three of the great groups are given with the description of the Brunizem great soil group. Other analyses of some of the soils have been reported by Ulrich and others (*20*) and by Barshad (*3*).

The great soil groups represented in the Area are Regosols, Lithosols, Brunizems, Yellowish-Brown Lateritic soils, Sols Bruns Acides, Planosols, Grumusols, Humic Gley soils, and Rendzinas.

Regosols and Lithosols

Soils of these two great soil groups have a dark-colored A horizon but little other development. The color of the surface soil usually ranges between very dark gray and grayish brown with chroma of 1 or 2 and value of 3 to 5. The content of organic matter is moderately low to moderate (from 1 to about 4 percent). The soils are well drained to somewhat excessively drained, and reaction ranges from neutral to medium acid. The main variation among the different soils is in depth to consolidated rock. The Baywood, Corralitos, Farallone, and Soquel soils were developed in gently sloping alluvium and are very deep. The other soils of the Regosols great soil group occupy steep and very steep uplands, and most of them are moderately deep. The Montara and Santa Lucia soils, however, are very shallow or shallow over rock and thus are Lithosols.

The soils formed from bedrock are so steep and erodible that there has been little opportunity for soil development. The other soils developed on alluvium that was deposited quite recently and are too young to have well-developed horizons. The predominantly grass or grass-shrub vegetation and the cool, coastal climate account for the high organic-matter content of the surface soil. The content of organic matter is much higher than in most soils of the coastal valleys and of central California. The Farallone and Sheridan soils are good examples of Regosols. Gazos and Laughlin soils range from shallow to fairly deep and thus have some properties of Regosols and some of Lithosols.

Brunizems

Brunizems have a grayish-brown or darker A_1 horizon that is very dark grayish brown or darker when moist. In most soils the A_1 horizon contains 2 to 6 percent organic matter. The soil has a weakly or moderately

developed B_2 horizon. A weak B horizon has about 5 to 10 percent more clay than the A or C horizon, and a strongly developed B horizon has 10 to 20 percent more. The structure of the B horizon is weak or moderate, medium, subangular blocky. Reaction ranges from neutral to strongly acid in all horizons except the C horizon, which may be moderately alkaline. In general, the pH is approximately slightly acid with most profiles showing little change or increasing slightly in pH with increasing depth. The soils are moderately deep or deeper. They occupy about one-fourth of the survey area.

Except for the Mindego series, all of the Brunizems were developed under grasses, shrubs, or mixed shrubs and grasses with some scattered oaks. The soils of the Mindego series developed under coniferous forests, either with high rainfall or in protected areas with summer fogs. Their reaction is about neutral or slightly acid in all horizons and increases slightly from the B_2 horizon to the parent rock. This is probably because bases are released during decomposition of the basalt. Probably the carbon-nitrogen ratio of the A horizon exceeds 14. Thus the Mindego soils have some characteristics of Brunizems and some of Yellowish-Brown Lateritic soils.

The Botella, Colma, Lobitos, Lockwood, Los Gatos, and Sweeney soils are weakly developed Brunizems. The Denison, Elkhorn, Lockwood, brown subsoil variant, Mindego, Miramar, and Tunitas soils are moderately developed Brunizems. The Lobitos, Sweeney, and Denison soils were sampled at two different locations, and the samples were analyzed. Duplicate samples of different profiles in each series were similar. Data will be presented, therefore, for only one sample location of each series. The sample sites were the type locations of these three series for which detailed descriptions of the profiles are given. The analytical data are given in table 12.

Lobitos loam was sampled on a southeast-facing slope of 60 percent, at an elevation of 300 feet, where the topography is rolling to mountainous. The average annual rainfall at this location is about 25 inches. Vegetation consists of annual grasses, a few perennial grasses, poison-oak, Baccharis, California sage, and Ceanothus.

Sweeney sandy clay loam was sampled on a simple, southeast-facing slope, at an elevation of 2,100 feet, in hilly to mountainous topography. The average annual rainfall is about 35 to 40 inches. Vegetation consists of annual grasses, wild oats, soft chess, and several forbs.

Denison clay loam was sampled on a smooth, very gently sloping alluvial fan on a marine terrace about 20 feet above sea level. The slope is about ½ percent toward the west. The average annual rainfall at this location is about 25 inches. The soil was in cultivation.

The data show that the three soils are similar. The Sweeney soil contains much less organic matter than the Lobitos and Denison soils, and the Denison soil has a much thicker solum, with more clay in the B_2 horizon, than the other two soils. In all three profiles the degree of base saturation increases slightly with depth, even though the Lobitos soil tends to be more acid with increasing depth. The moderate depth of the Lobitos soil and the shattered underlying rock probably permit leaching of bases. Calcium is the principal cation in all three profiles. The Sweeney profile has a Ca : Mg ratio of about 1 throughout; the Ca : Mg ratio of the other two profiles approaches 1 with increasing depth. The Denison soil contains the most sodium; it probably has been leached less than the other soils because of its higher content of clay. The Denison soil is near the ocean where it receives some salt spray.

Clay-mineral investigations of the Lobitos, Sweeney, and Denison soils indicate that montmorillonite is the principal clay mineral in all three soils. The Lobitos and Sweeney soils also contain appreciable mica (illite), and the Denison soil contains some kaolinite (5 to 15 percent).

Yellowish-Brown Lateritic soils

Soils of this great soil group developed either under relatively high rainfall or in protected sites where evaporation is fairly low and summer fogs are frequent. Vegetation consists mainly of Douglas-fir, redwood, and hardwoods. The soils have a light yellowish-brown to light brownish-gray A horizon and a reddish-yellow or brown B horizon. The clay content increases slightly from the A to the B horizon. The A_1 horizon has moderate, granular structure, and the structure of the lower horizons tends to be weak, subangular blocky. The reaction decreases from slightly acid or medium acid in the A horizon to medium acid or strongly acid in the B_2 horizon, but with little change below. Boundaries between horizons are gradual. The Butano and Josephine series are the only two representatives of this group.

Sols Bruns Acides

Sols Bruns Acides have a brown or pale-brown A horizon, which grades to a light yellowish-brown or very pale brown "color" B horizon, herein designated (B). The clay content is about uniform throughout the profile. The A_1 horizon has weak, granular structure, and the (B) is very weak, subangular blocky. The reaction tends to decrease, with depth, from medium acid to strongly acid. The Hugo series is the only member of this group in the survey area. A representative profile is described in the section, Descriptions of Soil Profiles, and laboratory data are given in table 12.

Hugo fine sandy loam was described and sampled on a convex, south-facing slope of 45 percent in mountainous topography at an elevation of about 1,900 feet. The vegetation consists of second-growth redwood and Douglas-fir with an understory of tanbark oak, madrone, and some fern.

Differential thermal and X-ray analyses indicate that vermiculite and kaolinite are the principal clay minerals. About 10 percent of kaolinite is present in the parent rock and the (B) horizon and 5 percent in the A_1 horizon. Interstratified vermiculite and montmorillonite are present in the parent rock; vermiculite with intermediate properties between the two interstratified minerals is present in the $(B)_{22}$ horizon, and progressively better ordered vermiculite occurs in the $(B)_{21}$ and the A_1 horizons.

Planosols

Planosols are characterized by a thick A horizon that is grayish brown to very dark gray in color but which is usually slightly or distinctly lighter colored in the

TABLE 12.—*Laboratory analyses of representative soils of San Mateo Area, Calif.*[1]

[Analyses by Soil Survey Laboratory, Riverside, Calif.]

Soil and horizon	Depth	pH		Electrical conductivity Ecx10 [3] millimhos per 100 cm. at 25° C.	Extractable cations (meq. per 100 grams of soil)					Base saturation	Na saturation [2]	Saturation extract soluble (milliequivalents per liter)				
		Paste	1:10		Ca	Mg	Na	K	H			Na	K	Ca and Mg	HCO_3	Cl
Lobitos loam (S55-Cal-41-13):	*Inches*									*Percent*	*Percent*					
A_{11}	0–9	5.9	6.5	----------	16.2	7.7	1.1	1.7	8.0	77	3.2	----	----	----	----	----
A_{12}	9–18	5.9	6.3	----------	14.8	9.5	1.3	.5	6.3	80	4.0	----	----	----	----	----
B_2	18–29	5.7	6.7	----------	14.6	12.0	1.4	.5	5.9	83	4.1	----	----	----	----	----
C	29–34	5.8	6.8	----------	15.6	11.7	1.5	.4	4.9	86	4.4	----	----	----	----	----
D_r	34+	----	----	----------	----	----	----	----	----	----	----	----	----	----	----	----
Sweeney sandy clay loam (S55-Cal-41-10):																
A_1	0–7	6.4	6.9	0.4	21.0	19.8	1.1	.2	6.6	86	2.3	0.8	(3)	2.8	2.4	0.4
B_2	7–16	6.3	6.9	.5	23.1	20.0	.9	.2	6.3	88	1.8	.8	0.1	3.3	2.2	.3
B_3	16–22	6.7	7.2	.4	25.8	23.1	.9	.2	6.5	89	1.6	.7	(3)	2.5	1.5	0
C_1	22–33	6.7	7.3	.4	28.0	24.4	.9	.1	5.5	91	1.5	.6	(3)	2.4	1.2	0
C_{21}	33–45	6.9	7.4	.3	26.8	22.6	1.1	.1	6.6	89	1.9	.6	(3)	1.4	.9	0
C_{22}	45–57	7.0	7.2	.3	26.7	22.2	1.2	.1	6.1	89	2.1	.6	(3)	4.2	.9	0
C_{23}	57–65	7.2	7.3	.3	24.3	21.1	1.2	.1	4.9	91	2.1	.7	(3)	2.0	.7	0
Denison clay loam (S55-Cal-41-1):																
A_{1p}	0–5	5.8	6.6	1.0	25.2	12.8	1.3	.4	10.1	80	2.6	3.9	.1	8.6	1.4	1.9
A_{12}	5–10	6.3	7.2	.7	29.5	14.5	1.5	.4	7.6	86	2.8	3.3	.1	3.6	2.4	1.9
B_{21}	10–23	6.2	7.3	.7	30.0	20.3	1.9	.3	8.4	86	3.1	3.7	.1	3.2	3.7	2.3
B_{22}	23–34	6.5	7.6	.7	19.8	19.8	1.9	.3	2.8	94	4.3	3.8	<.1	2.4	1.4	2.3
B_3	34–45	7.0	8.2	.6	18.5	16.6	1.7	.3	4.9	88	4.0	3.6	<.1	1.6	.6	2.1
C_1	45–52	7.3	8.5	.5	19.6	17.3	2.1	.3	2.8	93	5.0	3.6	<.1	1.3	.7	1.9
C_2	52–61	7.5	8.6	.5	21.3	17.2	2.3	.3	3.5	92	5.1	3.5	<.1	1.1	.7	2.1
D_g	61–70	7.3	8.5	.7	16.5	11.2	1.9	.2	2.4	93	5.9	4.4	<.1	1.5	.6	3.2
Hugo fine sandy loam (S57-Cal-41-1):																
A_1	0–8	5.3	5.7	.2	3.0	1.0	.2	.2	4.7	48	2.2	.1	.2	1.3	.5	.3
$(B)_{21}$	8–26	5.5	5.9	.1	3.4	1.0	.2	.2	2.7	64	2.7	.7	.1	1.0	.3	.2
$(B)_{22}$	26–40	5.5	5.9	.1	3.3	1.2	.2	.1	3.2	60	2.5	.7	.1	.6	.1	.3
D_r (Parent rock)	40+	----	----	----------	----	----	----	----	----	----	----	----	----	----	----	----
Tierra fine sandy loam (S55-Cal-41-4):																
A_{1p}	0–7	5.7	6.5	.4	8.9	4.9	.5	.3	11.3	56	1.9	2.7	.1	2.0	1.6	1.2
A_{12}	7–13	5.7	6.5	.3	8.8	5.6	.6	.2	11.9	56	2.2	2.3	.1	1.7	1.5	.8
A_{21}	13–17	5.8	6.6	.3	9.5	5.5	.6	.3	8.9	64	2.4	2.2	.1	1.0	.9	.4
A_{22}	17–21	5.8	6.8	.4	5.5	4.0	.5	.1	5.9	63	3.1	2.7	.1	.9	.6	.7
B_{21}	21–30	6.2	7.5	.6	9.9	4.0	2.0	.3	5.5	75	9.2	4.2	.1	.3	.3	3.5
B_{22}	30–41	6.6	7.7	1.4	10.4	11.2	2.7	.3	3.9	86	9.5	10.7	.1	2.6	.3	11.7
B_{23}	41–50	6.7	7.8	1.7	10.7	12.4	3.3	.3	3.4	89	11.0	19.4	.1	5.2	.3	23.4
C	50–60	6.6	7.8	3.1	9.6	11.4	3.9	.3	2.9	90	13.9	21.3	.1	5.6	.1	27.5
Watsonville loam (S55-Cal-41-12):																
A_{11}	0–9	5.4	6.1	1.2	5.2	4.8	1.0	.5	9.1	56	5.0	7.7	.3	4.1	2.1	6.4
A_{12}	9–12	5.5	6.3	.7	6.2	5.1	1.2	.2	8.2	61	5.7	5.9	.1	1.8	2.3	2.5
B_{21}	12–21	5.2	6.4	.8	7.7	13.9	2.2	.4	8.6	74	6.7	5.8	.1	1.4	.7	4.2
B_{22}	21–36	5.0	6.0	2.4	6.1	10.4	3.5	.4	8.0	72	12.3	8.1	.1	4.7	.4	20.0
B_{23}	36–46	4.7	5.9	4.1	6.5	12.6	4.5	.4	8.0	75	14.1	29.8	.1	6.6	.3	33.2
B_3	46–54	4.7	5.7	4.3	4.4	9.3	4.2	.2	6.9	72	16.8	34.0	.1	5.7	.4	36.6
C	54–64	4.7	5.8	4.1	6.5	12.7	6.9	.4	4.2	86	22.5	32.3	.2	4.6	.2	34.9

Soil and horizon	Depth	Size class and diameter of particles							Bulk density	Moisture tensions at—		Organic carbon	Total nitrogen	C/N ratio	Free iron oxide (Fe_2O_3)
		Very coarse sand (2.0–1.0 mm.)	Coarse sand (1.0–0.5 mm.)	Medium sand (0.5–0.25 mm.)	Fine sand (0.25–0.10 mm.)	Very fine sand (0.10–0.05 mm.)	Silt (0.05–0.002 mm.)	Clay (less than 0.002 mm.)		⅓ atmosphere	15 atmospheres				
	Inches	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Gm. per cc.*	*Percent*	*Percent*	*Percent*	*Percent*		*Percent*
Lobitos loam (S55–Cal–41–13):															
A_{11}	0–9	0	0.2	0.2	1.7	29.0	46.7	22.2	-------	30.4	15.1	2.84	0.233	12.2	-------
A_{12}	9–18	0	.1	.2	1.7	31.0	41.9	25.1	-------	28.6	15.1	1.44	.142	10.1	-------
B_2	18–29	0	.1	.2	1.2	25.5	41.9	31.1	-------	30.9	16.8	.77	-------	-------	-------
C	29–34	0	.1	.2	1.5	26.0	46.3	25.9	-------	30.3	17.0	.54	-------	-------	-------
D_r	34+	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------
Sweeney sandy clay loam (S55–Cal–41–10):															
A_1	0–7	.9	4.5	6.4	23.8	14.4	25.1	24.9	1.33	23.8	12.8	1.48	.112	13.2	1.1
B_2	7–16	.6	3.6	5.3	22.6	13.7	25.3	28.9	1.48	25.2	14.0	1.12	.096	11.7	1.2
B_3	16–22	.8	7.1	7.8	26.1	15.3	23.9	19.0	-------	24.6	14.0	.40	.042	9.5	1.0
C_1	22–33	1.4	9.9	9.5	27.8	14.2	24.5	12.7	-------	23.0	14.0	.19	-------	-------	1.1
C_{21}	33–45	3.1	15.7	11.8	27.6	13.9	19.5	8.4	1.65	19.4	11.6	.08	-------	-------	.7
C_{22}	45–57	3.0	18.1	13.5	28.9	13.0	17.8	5.7	-------	19.0	11.0	.05	-------	-------	.7
C_{23}	57–65	1.9	16.3	14.6	30.3	13.6	18.2	5.1	-------	18.8	10.2	.09	-------	-------	.7
Denison clay loam (S55–Cal–41–1):															
A_{1D}	0–5	4.9	6.3	3.8	8.8	7.9	34.6	33.7	-------	29.3	16.4	3.67	.266	13.8	-------
A_{12}	5–10	4.8	5.7	3.9	9.3	8.2	35.1	33.0	-------	31.4	16.6	3.42	.260	13.2	-------
B_{21}	10–23	2.3	4.5	3.0	6.7	6.0	32.3	45.2	-------	36.9	21.3	3.15	.189	16.7	-------
B_{22}	23–34	3.5	5.3	3.5	7.1	6.3	30.8	43.5	-------	35.6	19.6	2.19	.121	18.1	-------
B_3	34–45	5.0	6.3	3.6	6.4	6.7	32.3	39.7	-------	32.7	17.2	.48	.030	16.0	-------
C_1	45–52	2.9	4.3	2.6	5.1	6.8	39.1	39.2	-------	34.0	17.9	.34	.018	18.9	-------
C_2	52–61	2.1	3.3	2.0	4.1	5.8	45.8	36.9	-------	35.2	18.4	.16	.017	9.4	-------
D_g	61–70	13.3	13.3	6.0	10.7	7.7	32.5	16.5	-------	25.5	11.1	.12	.030	4.0	-------
Hugo fine sandy loam (S57–Cal–41–1):															
A_1	0–8	2.1	14.0	13.3	26.1	14.1	25.3	5.1	-------	13.3	3.8	.73	.031	23.5	.9
$(B)_{21}$	8–26	2.0	14.8	14.0	25.8	14.4	24.0	5.0	-------	12.1	3.7	.22	.015	14.6	1.2
$(B)_{22}$	26–40	2.8	17.8	13.5	25.3	13.4	21.8	5.4	-------	11.4	4.1	.16	.010	16.0	1.1
D_r (Parent rock)	40+	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------
Tierra fine sandy loam (S55–Cal–41–4):															
A_{1D}	0–7	.1	.8	2.2	34.0	18.4	24.7	19.8	1.25	20.5	8.8	2.85	.202	14.1	.9
A_{12}	7–13	.0	.7	2.6	33.8	18.2	25.8	18.9	-------	20.7	9.1	2.53	.190	13.3	.9
A_{21}	13–17	.0	.8	2.8	34.7	18.8	25.2	17.7	1.51	19.6	8.0	1.43	.099	14.4	.9
A_{22}	17–21	.1	1.1	3.1	36.0	20.3	25.8	13.6	-------	17.1	6.0	.71	-------	-------	.9
B_{21}	21–30	.0	.5	1.8	25.6	14.7	20.2	37.2	-------	31.5	19.1	.58	-------	-------	1.3
B_{22}	30–41	.0	.5	1.5	26.4	13.0	22.3	36.3	1.57	34.1	18.0	.40	-------	-------	1.1
B_{23}	41–50	.0	.4	1.6	30.3	13.1	21.8	32.8	-------	26.2	17.8	.27	-------	-------	1.1
C_1	50–60	.0	.4	1.8	32.3	13.5	24.0	28.0	1.59	29.4	14.5	.16	-------	-------	1.1
Watsonville loam (S55–Cal–41–12):															
A_{11}	0–9	.9	2.2	3.1	14.9	11.7	49.9	17.3	1.45	23.6	8.6	2.53	.185	13.7	-------
A_{12}	9–12	1.0	2.1	3.1	14.2	16.7	43.4	19.5	-------	22.6	8.6	1.87	.146	12.8	-------
B_{21}	12–21	.7	1.7	2.4	8.8	12.2	30.4	43.8	1.58	33.4	17.9	.95	.097	9.8	-------
B_{22}	21–36	.7	1.7	2.4	8.9	12.8	31.5	42.0	-------	33.7	17.6	.65	-------	-------	-------
B_{23}	36–46	.4	1.5	1.9	7.5	13.2	36.7	38.8	-------	33.6	16.6	.48	-------	-------	-------
B_3	46–54	.0	.4	.5	4.3	19.6	41.5	33.7	-------	35.0	16.0	.28	-------	-------	-------
C	54–64	1.8	5.5	5.4	16.9	17.4	30.9	22.1	1.62	26.1	11.0	.13	-------	-------	-------

[1] pH determined with Beckman glass electrode; electrical conductivity and soluble cations and anions by methods described in USDA Handbook No. 60; extractable cations by methods described in USDA Cir. 757 (H by $BaCl_2$-triethanolamine and others by NH_4 acetate).

Mechanical analysis by pipette method; bulk density from undisturbed cores; moisture tensions determined as described in USDA Handbook No. 60 (*21*); organic carbon determined by heat of dilution as described in USDA Cir. 757 (*13*); total nitrogen determined by the AOAC (Association of Official Agricultural Chemists) Kjeldahl method; and free iron oxides determined by reduction with sodium dithionite (unpublished procedure by V. J. Kilmer) and titration with Na_2H_2 EDTA.

[2] In relation to sum of extractable cations.

[3] Trace.

lower part, the A_2 horizon. The A_1 horizon contains about 3 to 6 percent organic matter, and the A_2 horizon, 1 to 4 percent. The A horizon rests abruptly on the grayish to yellowish-brown B_2 horizon of clay or clay loam. Reaction is variable and shows no consistent trend. The surface soil is likely to be slightly to strongly acid, and deeper horizons may be about the same, more nearly neutral, or slightly more acid. The structure of the B_2 horizon may be columnar, prismatic, or angular blocky with continuous clay films on the faces of peds. Depth of the solum is variable, but it commonly is over 5 feet where the soil is developed in unconsolidated sediments. The soils occupy about 10 percent of the survey area. They are on old terraces or gentle, concave slopes.

The Tierra soils, Tierra soils, acid variant, Watsonville soils, and Pomponio soils are all Planosols. Except for the inextensive acid variant of the Tierra series, which developed under shrubs, they developed under grass vegetation. The Tierra soils and Watsonville soils were each sampled at two different locations. One of the sample sites was the type location of the Tierra series in the survey area, and its description is given in the section, Descriptions of Soil Profiles. Site characteristics of the profiles sampled and a description of the Watsonville profile follow. The laboratory data are given in table 12.

Tierra fine sandy loam was described and sampled on a slightly concave, west-facing slope of 14 percent, at an elevation of about 475 feet, on hilly and steep, dissected terrace remnants. The average annual rainfall is about 23 inches. The site was cultivated, but now it is a pasture with annual fescue, ryegrass, and forbs.

Watsonville loam was sampled about 100 feet north of the end of Rose Road, just off the edge of a gully in a nearly level terrace adjoining the ocean. The sample was taken south and west of the town of Half Moon Bay at an elevation of 70 feet. The average annual rainfall at this location is about 22 inches. Vegetation consists of annual grasses and forbs and coyotebrush. The profile was described as follows:

A_{11} 0 to 9 inches, gray (10YR 5/1) loam; very dark brown (10YR 2/2) when moist; weak, fine, subangular blocky structure; very hard when dry, friable when moist, and very slightly plastic and nonsticky when wet; many fine roots and pores; few wormcasts; few fine, dark, round concretions; siliceous, fine particles of rock are common in this horizon and throughout the profile; medium acid, pH 6.0; clear, smooth lower boundary.

A_{12} 9 to 12 inches, gray (10YR 5/1) loam; very dark brown (10YR 2/2) mottled with yellowish brown (10YR 5/6 and 5/8) when moist; weak, fine, subangular blocky structure; hard when dry, friable when moist, and very slightly plastic and nonsticky when wet; peds just above the B_2 horizon have gray coatings; many fine, dark, round concretions; medium acid, pH 6.0; abrupt, smooth lower boundary.

B_{21} 12 to 21 inches, very dark gravish-brown (10YR 3/2) clay; very dark brown (10YR 2/2) when moist; strong, medium and coarse, angular blocky structure; extremely hard when dry, very firm when moist, and very plastic and sticky when wet; few roots between blocks; thick, nearly black (10YR 2/1 when moist); continuous clay films; few fine, dark, round concretions; medium acid, pH 5.8; clear, smooth lower boundary.

B_{22} 21 to 36 inches, prominently mottled grayish-brown (2.5Y 5/2) and brownish-yellow (10YR 6/7) clay, very dark grayish brown (2.5Y 3/2) and yellowish brown (10YR 5/7) when moist; moderate, medium, angular blocky structure; extremely hard when dry, very firm when moist, and very plastic and sticky when wet; few roots along ped faces; moderately thick, nearly continuous, black (10YR 2/1) clay films on faces of peds, very dark grayish brown (2.5Y 3/2) when moist; strongly acid, pH 5.5; clear, smooth lower boundary.

B_{23} 36 to 46 inches, prominently mottled dark grayish-brown (2.5Y 4/2) and grayish-brown (2.5Y 5/2) clay; very dark grayish brown (2.5Y 3/2) and dark grayish brown (2.5Y 4/2) when moist; weak, medium and fine, angular blocky structure; extremely hard when dry, very firm when moist, and very plastic and sticky when wet; thin, continuous, dark-colored clay films on vertical faces of peds; many fine, round, dark concretions; very strongly acid, pH 5.0; clear, smooth lower boundary.

B_3 46 to 54 inches, distinctly mottled light yellowish-brown (2.5Y 6/4) and light olive-brown (2.5Y 5/4) silty clay, light olive brown (2.5Y 5/4), olive brown (2.5Y 4/4), and strong brown (7.5YR 5/7) when moist; weak, fine, subangular blocky structure; extremely hard when dry, very firm when moist, and very plastic and slightly sticky when wet; no roots; a few thin, discontinuous clay films of light olive brown (2.5Y 5/4) when moist; many, diffuse, fine, orange mottles; very strongly acid, pH 5.0; clear, smooth lower boundary.

C 54 to 64 inches, prominently mottled light yellowish-brown (2.5Y 6/4) and brownish-yellow (10YR 6/7) sandy clay loam; light olive brown (2.5Y 5/4) and yellowish brown (10YR 5/7) when moist; massive; hard when dry, firm when moist, and slightly plastic and slightly sticky when wet; very strongly acid, pH 5.0.

The laboratory data in table 12 indicate that the clay content of the B_2 horizons of the Tierra soil and of the Watsonville soil is about double that of the A horizons in each of the same profiles. The bulk density is lowest in the A_1 horizon, increases markedly in the A_2 or B_2 horizons, and increases only slightly at greater depths. Free iron oxides in the Tierra soil are highest in the B_{21} horizon and lowest in the A_1 and A_2 horizons. The electrical conductivity, the degree of base saturation, and the exchangeable sodium and magnesium of the Tierra and Watsonville profiles increase with increasing depth, whereas the exchangeable calcium, hydrogen, and potassium decrease. The saturation extract soluble cations are largely sodium, calcium, and magnesium, with sodium predominating in the lower B_2 horizon and below. Chloride is the dominant anion. The greater salt content of these Planosols at increasing depths indicates that they are incompletely leached when compared with associated Brunizems. Undoubtedly, the clayey B_2 horizon of the Planosols reduces movement of water through them.

Mineralogical analyses of the Tierra soil indicate that the clay minerals of the parent material are dominantly montmorillonite, with appreciable mica (illite), and no kaolin. The A_{12} and B_{21} horizons contain very poorly organized, probably finely divided, much interlayered montmorillonite, vermiculite, mica (illite), and a trace of kaolin.

Grumusols

Grumusols are characterized by a thick, very dark gray A horizon, which gradually grades or tongues into the underlying parent material. The A horizon is dominantly fine textured, slightly acid to mildly akaline, and contains slickensides in the lower part. The C horizon is moderately fine textured and is medium acid to moderately alkaline. The soil is massive (without structure) when wet but cracks widely, on drying, into irregular blocks and prisms. The soils developed under grass vegetation with a few scattered oaks.

The Cayucos and Dublin soils are the Grumusols in the survey area. The Dublin soils are moderately well drained to imperfectly drained. In the more nearly level areas, these soils have some properties of Humic Gley soils, such as a high content of organic matter in the A horizon and low chroma in all horizons. The Cayucos soils are sloping to very steep and are well drained to somewhat excessively drained.

Humic Gley soils

Humic Gley soils have a grayish-brown or gray, peaty A horizon, which may be mottled, and light-gray parent material. The soils occur at about sea level and have a high water table. The Coquille series is the only member of this group, and it is of very minor extent.

Rendzinas

The Rendzinas have a very dark grayish-brown A horizon that grades to a brown C horizon. Crystalline limestone is present at a moderate depth. The soil is slightly calcareous and friable throughout. The Calera series, which is very inextensive, is the sole representative of this group.

Additional Facts About the San Mateo Area

The preceding sections have given information about the general nature of the San Mateo Area. They have given a detailed description of each soil mapped and suggested suitable management. The following section gives some additional facts about the Area, including information about the water supplies, ownership of the land, transportation and markets, development of the communities, and forests.

Water Supplies

In the following subsection the availability of water for irrigation, ground water supplies, and runoff and reservoir storage are discussed. Information is also given about the quality of surface water in the Area, and a table is provided giving data obtained by analyzing the water from 15 creeks in the Area.

Water for irrigation

The lack of summer rainfall is one of the main factors limiting farming in this Area. The specialty crops of flowers and vegetables produce high income, but they require irrigation for satisfactory growth. Without water during the summer months, there also would be no green feed for livestock.

The season when irrigation water is needed begins about May and lasts through October. During this period, irrigation with 1½ to 2 acre-feet of water is needed for most crops in addition to water stored in the soil from winter rains. Water is obtained in three ways: (1) Some is pumped directly from creeks to the land or is pumped into storage reservoirs, and the crop is irrigated when enough is stored; (2) water is pumped from small wells into reservoirs, where it is temporarily stored for use; (3) winter runoff is collected in reservoirs behind impounding dams. The amount of water in storage may be increased if creeks or wells are nearby where water can be pumped into the reservoirs.

It is estimated that between 2,000 to 3,000 more acres of land in the Area can be irrigated by developing additional reservoirs, impounding dams, flashboard dams, and wells. Since most of the nearly level land is already irrigated, new irrigation will need to be on sloping land. Usually, sprinkler irrigation will permit soil conservation and efficient use of water on the sloping land.

Most of the irrigated land is on the coastal benches, which extend from Princeton in the north to the Santa Cruz County line. Other irrigated areas are in small valleys and on flood plains near the creeks.

Ground water supplies

There are no large underground storage basins in this Area similar to those in the Sacramento, San Joaquin, and Salinas Valleys. Most of the wells yield only 15 to 100 gallons per minute. In some places the salt content of the underground water is too high for agricultural use.

Underground water from wells and springs can be relied upon to supply the needs for domestic water and livestock in the Area.

Runoff and reservoir storage

The selection of a suitable site for a reservoir depends on the topography and geology of the dam site and on the relation between required storage and annual runoff from the watershed. The number of good dam sites is limited. If the number of tributary acres behind a potential dam and the average annual rainfall are known, an approximate estimate of the average annual runoff can be computed.

Using Grunsky's method for estimating runoff, modified to fit local conditions, the depth of precipitation in inches occurring from October through April on a drainage area, multiplied by the same depth as percentage, may be considered as about equal to the runoff. From 20 to 50 percent of the annual runoff can thus be expected to drain into a reservoir. There will be variations because of differences in the soils and in the intensity and frequency of rainfall in any particular zone. These factors must be considered before selecting and building a reservoir.

Quality of surface water

Except along the coast, precipitation in the San Mateo Area is sufficient to leach out any soluble salts that are

formed in chemical breakdown of the natural rocks. An accumulation of some compounds, especially those of sodium, has the effect of weakening soil structure and causing the surface to seal, reducing or preventing the penetration of water.

The total salt content of a water sample is usually determined by measuring its ability to conduct an electric current. The measurement is reported as EC (electrical conductivity) times 10^3 at 25° C. A complete analysis is necessary to determine the kinds of salt present in a water sample. Boron compounds, if present in more than very minute amounts, are highly toxic to plants. The content of boron is usually expressed as parts per million.

The amount of sodium salts in water can be expressed as a percentage figure in relation to the total bases, including potassium, calcium, and magnesium, that are present. Equal in terms of chemical equivalents to the bases (cations) in a sample of water are the anions, such as chloride, sulfate, and carbonate. The concentration of any anion or cation can be stated in equivalents per liter. A liter is 1,000 cubic centimeters. Since the concentration in equivalents per liter is a small number, the results are multiplied by 1,000 for easier reading, giving values that express the number of milliequivalents per liter.

Table 13 gives a classification of irrigation waters in terms of electrical conductivity, parts per million of boron, percentage of sodium in relation to total bases, and milliequivalents of chlorides per liter. This table was taken from a bulletin of the State Water Resources Board (*9*).

Table 14 gives analyses of samples of water from 15 creeks or springs. Locations of the sampling stations are shown in figure 29. The data are from a bulletin of the California Agricultural Extension Service, entitled Agriculture, Population Increase, and Water Problems in San Mateo County, published January 1956 (*6*). Effective salinity, reported in the last column of the table, indicates the concentration of chemicals that can form harmful salts. Salts of calcium and magnesium, which do not cause problems in soils, do not influence the effective salinity as thus defined. Water that contains less than 7 milliequivalents per liter of effective salinity is generally considered to be safe for irrigation. None of the water samples reported exceeds this limit of tolerance.

Plants differ in their tolerance of excess salt, and the tolerance for different salts also varies. There is little likelihood that the kinds and amounts of salts carried by the streams in the Area will ever affect crops adversely when the water is used for irrigation.

TABLE 13.—*Qualitative classification of irrigation waters*

	Class I (excellent to good)	Class II (good to injurious)	Class III (injurious to unsatisfactory)
	Less than		*More than*
EC×10^3 at 25° C	1	1–3	3
Boron, p.p.m	0.5	0.5–2.0	2.0
Sodium, percentage of bases	60	60–75	75
Chloride, meq. per liter	5	5–10	10

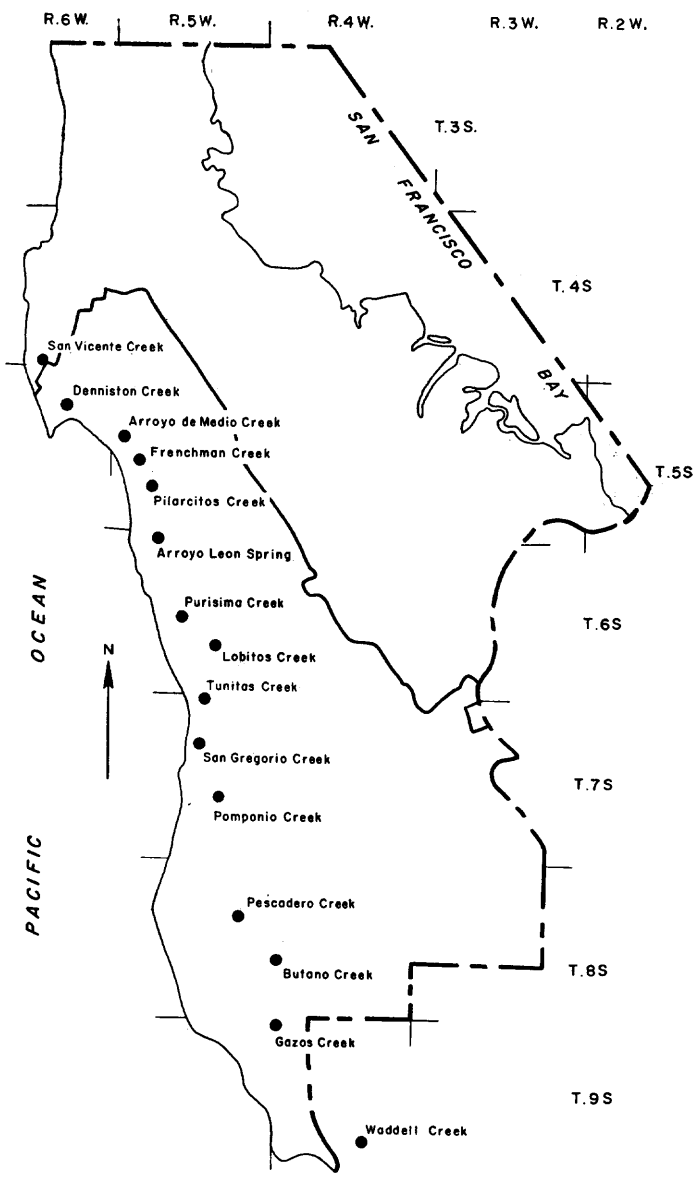

***Figure 29.*—Location of sampling for quality of water.**

Land and Its Ownership

From the days of the Mexican land grants until 1878, when surveyors staked out the present boundaries of the county, it is unlikely that its citizens thought that any sizable part would ever be publicly owned. The old grants had covered virtually all of the county; the parts they failed to cover were rapidly claimed by American settlers. Even though litigation over the Mexican rights and their confirmation by United States courts continued for decades, all the original grants were sold to private owners—ranchers, land speculators, and builders. Today, about 90 percent of the land in the county is still privately owned. Some 34,660 acres, however, belongs to public agencies.

The city of San Francisco owns more than 27,000 acres in San Mateo County. Of this acreage, 23,775 acres is

TABLE 14.—*Analysis of water from selected creeks used as sources for irrigation, stock, and domestic supplies in the San Mateo Area*

Name of creek or spring	EC X 10^3 25° C.		Boron	Sodium in total bases	Amounts of cations (milliequivalents per liter)					Amounts of anions (milliequivalents per liter)			Effective salinity
					Ca	Mg	Na		Total	HCO_3	SO_4	Cl	
	Oct. 12, 1954	Apr. 20, 1955					Oct. 12, 1954	Apr. 20, 1955					
			P.p.m.	*Percent*									
San Vicente	0. 39	0. 40	0. 04	49	1. 0	0. 9	1. 8	1. 7	3. 7	1. 7	0	2. 0	2. 0
Denniston	. 30	. 29	. 01	39	1. 2	. 7	1. 2	1. 1	3. 1	1. 9	0	1. 2	1. 2
Arroyo de Medio	. 46	. 45	. 04	45	1. 3	1. 3	2. 1	1. 8	4. 7	2. 4	. 4	2. 1	2. 3
Frenchman	. 39	. 40	0	47	1. 3	. 7	1. 8	1. 6	3. 8	2. 1	. 5	1. 3	1. 8
Pilarcitos	. 77	. 59	. 30	37	2. 8	1. 9	2. 7	1. 8	7. 4	3. 8	. 8	2. 8	3. 6
Arroyo Leon	. 90	. 83	. 10	30	4. 0	2. 4	2. 7	2. 6	9. 1	5. 6	1. 7	2. 0	3. 5
Purisima	. 89	. 81	. 18	29	4. 3	2. 1	2. 6	2. 5	9. 0	5. 8	1. 4	2. 1	3. 2
Lobitos	1. 20	1. 17	. 53	41	4. 2	2. 8	4. 9	4. 6	11. 9	5. 8	2. 4	4. 4	6. 1
Tunitas	1. 21	1. 11	. 36	43	3. 2	3. 4	5. 0	4. 8	11. 6	5. 2	1. 8	5. 3	6. 4
San Gregorio	1. 01	. 87	. 59	32	4. 1	2. 9	3. 3	2. 8	10. 3	5. 7	2. 4	2. 9	4. 6
Pomponio	. 91	. 79	. 22	38	2. 2	3. 1	3. 3	3. 4	8. 6	3. 1	2. 5	3. 5	5. 5
Pescadero	. 76	. 60	. 48	37	3. 0	1. 7	2. 7	1. 9	7. 4	4. 6	11. 1	2. 1	2. 8
Butano	. 43	. 35	. 12	32	1. 8	1. 2	1. 4	1. 1	4. 4	3. 0	. 4	1. 1	1. 4
Gazos	. 35	. 30	. 06	38	1. 3	1. 0	1. 4	1. 1	3. 7	1. 8	. 5	1. 1	1. 9
Waddell	. 35	. 30	. 14	39	1. 3	1. 0	1. 5	1. 1	3. 8	2. 4	. 4	. 9	1. 5

in the watersheds surrounding reservoirs owned by the city. The State of California holds most of the other public land. About 1,200 acres of this is in State highways, and about the same acreage is in tax-delinquent properties. Another 1,665 acres, owned by the State, is in Portola State Park and is covered by a magnificent redwood forest. Other small holdings include properties owned by the State Agricultural Association and mountain stations belonging to the Department of Public Works.

Federal military installations occupy about 1,520 acres. San Mateo County owns a little more than 1,400 acres in five parks. Huddart Park is the largest, 973 acres, and San Mateo County Memorial Park, 310 acres, is probably the best known by most residents for its recreational value.

Transportation and Markets

San Mateo County owes much of its agricultural and industrial development to its location and to the excellent network of railroads and highways. The railroad system is in the eastern part of the county and is not immediately accessible to the farming area with which this report is concerned. Nevertheless, it does have considerable influence in transporting farm products to distant markets and in bringing necessary farm implements and supplies into the general area.

Modern, heavily traveled highways complement the rail system. U.S. Highway 101 (El Camino Real) runs parallel to the railroad through Daly City and the bayside cities. Bayshore Highway, U.S. 101 Alternate, is a parallel route that bypasses the bayside cities on the shoreside and provides express freeway service by means of access roads. State Route 5, the Skyline Boulevard, along the Sierra Morena crest, which essentially outlines the eastern boundary of the surveyed area, and State Route 1, the Pacific Coast Highway, are also north-south through routes. The Skyline Boulevard follows the ridge of the hills lying from 1½ to 5 miles west of El Camino Real. It is at present a 2-lane road and will be developed ultimately as a 4-lane, divided highway.

The Pacific Coast route, State Route No. 1, follows the coast line and is a 2-lane road. It is lightly traveled and serves the sparsely settled agricultural areas.

A State highway carries east-west traffic between Half Moon Bay and San Mateo, and a county road runs east and west between San Gregorio and the Skyline Boulevard. A road from Pescadero meets this road at the town of La Honda. Several other east-west routes are of secondary importance.

In the county as a whole, there are 636 miles of road in State and county highway systems. In addition, an excellent airport is located just north of Half Moon Bay and several other airports are along the bay side of the county.

The coastal area, from which most agricultural products originate, is not served by a rail system. Trucks furnish the principal transportation both to distant and to nearby markets.

Artichokes are trucked to San Francisco and Santa Cruz for shipping to distant points as well as to local markets. Brussels sprouts and broccoli are processed almost entirely at freezing plants located in Sacramento and San Jose. A small part of these two crops is marketed as produce. Strawberries, a relatively new crop in the Area, are sent mostly to freezing plants near Watsonville.

The cut-flower industry of San Mateo County is of considerable economic importance. One of the important varieties grown is heather, which is shipped by air in large quantities to eastern markets. Narcissus, Dutch iris, and gladiolus bulbs are packed on the eastern side of the county and are bought by wholesale flower dealers for shipment to many points. Other flowers include stock and strawflowers; the latter are shipped to eastern markets.

All the flaxseed produced in the county is used for linseed oil. It is sent to San Francisco for processing.

Hay is grown extensively throughout the county, and most of it is consumed locally. In addition, considerable alfalfa hay is imported from other areas to supply dairy needs. Most of the oats and barley is consumed locally as feed.

Beef cattle, produced on the ranges and pastures of southwestern San Mateo County, are transported to slaughterhouses of South San Francisco or to packers in the vicinity of San Jose. A smaller number of sheep are handled in the same way. The rangeland also supports a considerable number of dairy replacement stock for local and more distant dairies.

Development of Communities

Under Spanish rule, the area that is now San Mateo County was used for rangeland for the cattle belonging to the Presidio of San Francisco and to Mission San Francisco. Under Mexican rule, the land was divided into 18 huge grants, several of whose owners lived in San Francisco. Many of the American settlers who came to San Francisco after the Mexican War built fortunes in the city and bought estates on the peninsula of San Mateo County.

With the coming of interurban transportation, during the last half of the 19th century, the suburbanites began building homes on San Mateo County's hills and in its valleys. Today, comfortable estates of San Francisco executives and professional people occupy many of the county's scenic hillsides, and thousands of workers commute from homes they have recently built in new San Mateo County subdivisions to jobs along the peninsula or in San Francisco. Retail stores in several bayside communities, whose growth during the last decade helped to more than double the population of the county, are thronged with shoppers from the suburbs.

Cities and towns in the bayside peninsula are centers of supply and distribution for farmers who raise a variety of specialty flower and vegetable crops, principally on the coastal side of the county.

On the coastal side, the two largest towns of the Area are Half Moon Bay in the north, with a population of 1,168, and Pescadero in the south, with a population of 1,000. These two towns are in the main farming centers. They have all the elementary and high schools of the surveyed area, except for the schools at La Honda and Kings Mountain. Other communities in the surveyed area are Princeton, El Granada, Miramar, Lobitos, San Gregorio, Sky Londa, and Loma Mar.

San Mateo County Memorial Park, Portola State Park, and Kings Mountain are popular as recreational areas during the vacation season and are enjoyed by many people of the Bay area. Various places along the coastal beach are also popular.

The entire Area is well served by electric and telephone lines. Although natural gas is available for home use along the bay side of the Peninsula, it has not as yet been piped along the coast. Bottled gas is used there to a great extent. Domestic water is available from a number of sources, including streams, reservoirs, and wells.

Forests [4]

Even with the dedication of additional land for recreation, the woodlands of the San Mateo Area will be important in the future. The forests lie within the well-known redwood—Douglas-fir region. Most of the timber-producing land is occupied by redwoods, usually in mixtures with Douglas-fir and a few broad-leaved trees, such as madrone, oak, and tanbark oak.

Redwood trees are noted for their great size, height, and age. The average redwood tree is about 6 feet in diameter; some are more than 20 feet in diameter, 350 feet in height, and more than 2,000 years old. An unusually favorable combination of trees, soils, topography, and climate has resulted in heavier stands of timber in the redwood forests than anywhere else in the world. The majestic beauty of the virgin stands, the enormous volumes of timber, the great size and age of the individual trees, and other unusual characteristics of the redwood all contribute to its worldwide renown.

The redwood groves have unusual scenic value as a tourist attraction and are desirable for recreation. This has resulted in the establishment, from former private timber holdings, of a number of State-owned redwood parks. These parks provide much-needed public recreational grounds for the expanding urban population. It is probable that additional redwood groves for use as State parks will be acquired in the future. Recreational use of redwood forest land in these parks and in some of the private holdings along the main highways is highly desirable.

The large urban population of the San Francisco Bay area exerts a strong pressure on the nearby forest land for small recreational and residential holdings. The persistent demand has established recreation and residence as major uses for much of the land. There is evidence that more and more rural land, agricultural as well as forest, will go into these types of use. The ownership pattern of small holdings of forest land is appropriate for this Area because the main objective of many owners is to hold the trees for their esthetic value rather than for producing timber.

Descriptions of Soil Profiles

Following are detailed descriptions of representative profiles of the different soil series in San Mateo County. The place in the county where each description was taken is given.

Technical terms used in describing the soils are defined in the Soil Survey Manual (*22*). Letters and subscripts

[4] Adapted from Tech. Paper No. 7, Calif. Forest and Range Expt. Sta. (*14*).

on the left designate the horizons in each soil profile. Combinations of letters and numbers in parentheses, such as (10YR 5/4), give a notation of color in terms of hue, value, and chroma. This notation is more precise than the color name, which is also given.

Baywood coarse sandy loam: Along the Coast Highway 250 yards north of Pescadero turnoff.

A_1 0 to 25 inches, gray (10YR 5/1) coarse sandy loam; very dark brown (10YR 2/2) when moist; weak, fine, granular structure; soft when dry, and, when moist, very friable grading to friable with depth; many fine roots and common medium-sized roots; porous; moderately low organic-matter content; medium acid, pH 6.0; gradual, smooth lower boundary; 20 to 40 inches thick.

C_{21} 25 to 56 inches, yellowish-brown (10YR 5/4) loamy sand; dark brown (7.5YR 4/3) when moist; few distinct, coarse, dark reddish-brown (5YR 3/4, moist), soft to hard iron concretions with black staining in the interiors; nearly massive; soft when dry, friable when moist; few fine roots in upper part; porous; very low organic-matter content; slightly acid, pH 6.3; gradual, smooth lower boundary.

C_{22} 56 to 65 inches +, similar to the horizon just above but dark yellowish brown (7.5YR 4/4) when moist.

Botella loam: Along Tunitas Creek Road at the Haet Ranch 0.75 mile east of State Highway No. 1.

A_1 0 to 18 inches, very dark gray (10YR 3/1) loam; black (10YR 2/1) when moist; strong, medium, granular structure; slightly hard when dry, friable when moist; abundant fine roots and pores; moderate organic-matter content; slightly acid, pH 6.3; gradual, smooth lower boundary; 15 to 20 inches thick.

A_3 18 to 28 inches, dark-gray (10YR 4/1), heavy loam; very dark grayish brown (10YR 3/2) when moist; moderate, medium, subangular blocky structure; hard when dry, friable when moist, slightly plastic and slightly sticky when wet; common fine roots and fine pores; moderately low organic-matter content; slightly acid, pH 6.5; gradual, smooth lower boundary; 5 to 10 inches thick.

B_2 28 to 48 inches, dark grayish-brown (10YR 4/2) clay loam; dark brown (10YR 3/3) when moist; moderate, medium, subangular blocky structure; very hard when dry, firm when moist, plastic and slightly sticky when wet; few fine roots and fine pores; very low in organic matter; thin, nearly continuous clay films on some ped faces; few, fine, faint, orange mottles; slightly acid, pH 6.5; gradual, smooth lower boundary; 15 to 25 inches thick.

C_1 48 to 60 inches, mottled grayish-brown and gray (10YR 5/2 and 5/1) clay loam; very dark grayish brown (10YR 3/2) when moist; a few, fine, yellowish-brown mottles; nearly massive; very hard when dry, firm when moist, plastic and slightly sticky when wet; few thin, discontinuous clay films; neutral, pH 7.0.

Butano silt loam: About 15 feet north of China Grade Road, at a point 1½ miles east of Cloverdale Road, near the center of the southeast quarter of section 20, township 8 south, range 4 west.

A_{00} and A_0 2 to 0 inches of fresh and partly decomposed forest litter, consisting of needles, leaves, twigs and branches; abrupt, smooth lower boundary; ¼ to 3 inches thick.

A_1 0 to 3 inches, light brownish-gray (10YR 6/2) silt loam; dark grayish brown (10YR 4/2) when moist; moderate, medium and fine, granular structure; very hard when dry, friable when moist; numerous roots and insect holes and wormholes; low in organic matter; medium acid; pH 6.0; clear, smooth lower boundary; 1 to 4 inches thick.

B_1 3 to 23 inches, pale-brown (10YR 6/3) silt loam; dark grayish brown (10YR 4/2) when moist; weak, fine, subangular blocky breaking to moderate, medium and fine, granular structure; very hard when dry, friable when moist; many roots; occasional hard fragments of weathered shale; very strongly acid, pH 4.7; gradual, smooth lower boundary; 10 to 26 inches thick.

B_2 23 to 28 inches, pale-brown (10YR 6/3), light clay loam; dark brown (10YR 4/3) when moist; weak, medium, subangular blocky breaking to moderate, fine and very fine, granular structure; very hard when dry, friable when moist; common thin, discontinuous clay films; common roots; numerous small, hard fragments of shale; very strongly acid, pH 4.7; gradual, smooth lower boundary; 3 to 8 inches thick.

B_3 and D_r 28 to 36 inches, brown (10YR 5/3) gravelly (cherty) silty clay loam; dark brown (10YR 4/3) when moist; few distinct, yellowish-brown stains on surfaces of chert and shale fragments; massive; very hard when dry, firm when moist; common thin, discontinuous clay films on surfaces of rock fragments; few large roots; very strongly acid, pH 5.0; clear, irregular lower boundary; 6 to 12 inches thick.

D_r 36 inches +, light-gray (10YR 6/1), fractured, bedded Monterey shale that is slightly weathered in the upper part; less weathered, less fractured, and harder below; dark grayish brown (10YR 4/2) when moist; few large tree roots; surfaces of rock along cracks have thin clay films of yellowish-brown color.

Calera loam: Near the western quarter corner of section 28, township 4 south, range 5 west, about 100 yards north of point where road turns north along eastern lobe of Pilarcitos Lake, between the two lobes.

A_1 0 to 10 inches, very dark grayish-brown (10YR 3/2) loam; very dark brown (10YR 2/2) when moist; moderate, fine granular structure; hard when dry, friable when moist; many fine roots and pores; moderate organic-matter content; mildly alkaline, pH 7.5; very slightly calcareous; gradual, smooth lower boundary; 4 to 12 inches thick.

C 10 to 30 inches, brown (10YR 4/3) clay loam; very dark grayish brown (10YR 3/2) when moist; moderate, medium, granular structure; slightly hard when dry, friable when moist; common fine and medium-sized roots; porous; mildly alkaline, pH 7.8; slightly calcareous; common fragments of limestone, increasing in number with depth; abrupt, irregular lower boundary; 0 to 50 inches thick.

D_r 30 inches +, white and dark-gray (N 8/0 or 10YR 4/1) crystalline limestone that is fractured in the upper part and contains, along the fracture planes, a very small amount of yellowish-brown (10YR 5/4) clay loam that is dark yellowish brown (10YR 4/4) when moist; many feet thick.

Cayucos clay loam: At north edge of San Gregorio Highway, 100 yards east of the intersection with Clear Creek Road.

A_{11} 0 to 7 inches, very dark gray (10YR 3/1) clay loam; black (10YR 2/1) when moist; nearly massive when dry, moderate, medium subangular blocky structure, when moist; very hard when dry, friable when moist, sticky and plastic when wet; abundant fine roots; slightly acid, pH 6.5; gradual, smooth lower boundary; 4 to 10 inches thick.

A_{12} 7 to 23 inches, similar to layer above, but the texture is clay and fine roots are common; common slickensides; gradual, smooth lower boundary; 10 to 18 inches thick.

A_{13} 23 to 32 inches, very dark gray (10YR 3/1) clay; black (10YR 2/1) when moist; common, medium-sized, faint mottles of dark grayish brown (10YR 4/2) that are very dark grayish brown (10YR 3/2) when moist; moderate, medium subangular blocky structure; very hard when dry, firm when moist, sticky and plastic when wet; common fine roots; few fine, hard, yellowish-brown concretions; common slickensides; slightly acid, pH 6.5; gradual, smooth lower boundary; 8 to 12 inches thick.

AC 32 to 39 inches, light olive-brown (2.5Y 5/3) clay with streaks and tongues of dark gray (10YR 4/1); olive brown (2.5Y 4/3) and very dark gray (10YR 3/1) when moist; nearly massive; very hard when dry, firm when moist; few roots; few fine, hard, yellowish-brown concretions; few slickensides; medium acid, pH 6.0; gradual, irregular lower boundary; 4 to 10 inches thick.

C_2 39 to 50 inches, light olive-brown (2.5Y 5/4) silty clay loam with few, medium, yellowish-brown (10YR 5/4) mottles; olive brown (2.5Y 4/4) and dark yellowish brown (10YR 4/4) when moist; numerous soft fragments of parent rock; a few roots along fracture planes; few fine, yellowish-brown concretions; medium acid, pH 6.0; gradual, irregular lower boundary; 6 to 20 inches thick.

D_1 50 inches +, light-gray (2.5Y 7/2), weathered and fractured Purisima shale; grayish brown (2.5Y 5/2) when moist, with brownish-yellow to dark yellowish-brown stains on fracture planes; extremely hard when dry, firm when moist; frequently slips occur near the upper part of this horizon.

Colma loam: About 1 mile south of Pomponio Creek along the Old Coast Road, near the top of the ridge on the south side of the road. Pescadero is the nearest town to the south.

A_{11} 0 to 4 inches, very dark gray (10YR 3/1) loam; black (10YR 2/1) when moist; moderate, medium granular structure; soft when dry, friable when moist; abundant fine roots; many wormcasts and insect holes; few rodent burrows; slightly acid, pH 6.5; clear, irregular lower boundary; 2½ to 4½ inches thick.

A_{12} 4 to 10 inches, very dark gray (10YR 3/1) loam; black (10YR 2/1) when moist; moderate, medium, subangular blocky structure; slightly hard when dry, friable when moist; abundant fine roots and common medium-sized roots; many wormcasts and insect holes; a few rodent burrows; slightly acid, pH 6.4; clear, irregular lower boundary; 5 to 7 inches thick.

A_3 10 to 17 inches, very dark gray (10YR 3/1) loam; black (10YR 2/1) when moist; weak, medium, subangular blocky structure; slightly hard when dry, friable when moist; abundant fine roots and common medium-sized roots; many wormcasts and insect holes; few rodent burrows; horizon contains light yellowish-brown fragments of material similar to that of the next lower horizon; slightly acid, pH 6.2; clear, wavy lower boundary; 6 to 8 inches thick.

B_{21} 17 to 28 inches, light yellowish-brown (10YR 6/4) loam; brown (10YR 5/3) when moist; weak, coarse and medium, subangular blocky structure; slightly hard when dry, friable when moist; roots, wormcasts, and insect holes are numerous but not so common as in the upper horizons; occasional worm, insect, and rodent burrows, and root holes filled with surface soil; few, strong-brown, medium, faint mottles; few thin, discontinuous, strong-brown clay films; medium acid, pH 6.0; diffuse, irregular lower boundary; 10 to 17 inches thick.

B_{22} 28 to 39 inches, brown (10YR 5/3) loam containing spots that are slightly more clayey; dark brown (10YR 4/3) when moist; weak, medium, subangular blocky structure; few wormcasts, insect holes, and rodent burrows; few fine and medium-sized roots; few thin, discontinuous clay films; common, dark-red, medium, prominent mottles (2.5YR 3/8); medium acid, pH 5.8; abrupt, irregular lower boundary; 10 to 17 inches thick.

C 39 inches +, light yellowish-brown (10YR 6/4) fine sandy loam; yellowish brown (10YR 5/4) when moist; weakly consolidated; breaks to angular blocky structure; can be crushed between the fingers when moist; ped faces stained with reddish brown or strong brown; penetrated in the upper part by fine roots along the structural breaks; medium acid, pH 5.9; many feet thick.

Coquille peaty loam: ¼ mile west of bridge over Pescadero Creek along State Highway No. 1.

A_{11} 0 to 2 inches, gray (10YR 5/1), fibrous organic matter; dark gray (10YR 4/1) when moist; somewhat decomposed and contains lenses of silt loam; cracks widely (up to 6 inches) upon drying; medium acid, pH 5.7; abrupt to clear, smooth lower boundary; 0 to several feet thick.

A_{12g} 2 to 10 inches, grayish-brown (10YR 5/2) peaty loam; very dark grayish brown (10YR 3/2) when moist; weak, fine, granular structure; soft when dry, friable when moist; many, medium, yellowish-red (5YR 5/6) mottles, reddish brown (5YR 4/4) when moist; strongly acid, pH 5.5 in the upper part, grading to slightly acid, pH 6.5 at the bottom; clear, smooth lower boundary; 6 to 12 inches thick.

A_{13g} 10 to 18 inches, light brownish-gray and light-gray (10YR 5/2, 6/1) clay loam; dark grayish brown and dark gray (10YR 4/2 and 4/1) when moist, with a few darker colored streaks; massive when moist, cracking to large blocks when dry; very hard when dry, friable when moist, slightly sticky and slightly plastic when wet; few, medium, yellowish-red and reddish-brown mottles; high in organic matter; neutral, pH 7.0; 5 to 10 inches thick.

C_g 18 inches +, light-gray (10YR 6/1) fine sandy loam; gray (10YR 5/1) when moist; massive; soft when dry, friable when moist; strongly mottled with bluish gray, light gray, and reddish brown when moist; water table is in or above this horizon most of the time; moderately alkaline, pH 8.0; many feet thick.

Corralitos sandy loam: 2 miles southeast of Pescadero, just west of Cloverdale Road, and about 0.6 mile northwest of bridge over Butano Creek.

A_1 0 to 18 inches, grayish-brown (10YR 5/2) sandy loam; very dark grayish brown (10YR 3/2) when moist; weak, fine, granular structure; slightly hard when dry, friable when moist; common fine roots; low to moderately low in organic matter; slightly acid, pH 6.3; gradual, smooth lower boundary; 12 to 24 inches thick.

C 18 to 72 inches, speckled brown, black, and white, stratified sand and loamy sand, and grayish-brown sandy loam; single grain or massive; loose or soft when dry, friable when moist; a few fine roots; slightly acid, pH 6.3.

Denison clay loam: In a cultivated field about 40 feet east of the sea cliff, 200 yards east of the village of Princeton.

A_{1p} 0 to 5 inches, black (10YR 2/1) clay loam; black (10YR 2/1) when moist; common fine, white specks (quartz grains); cloddy as a result of tillage; clods break to weak, fine granules; very hard when dry, friable when moist, plastic and sticky when wet; numerous wormcasts; abundant fine roots; medium acid, pH 5.8; abrupt, smooth lower boundary; 4 to 7 inches thick.

A_{12} 5 to 10 inches, clay loam of the same color as the horizon above; weak, very coarse and coarse prisms that break to weak, medium granules; very hard when dry, friable when moist, plastic and sticky when wet; many wormcasts; abundant fine roots; slightly acid, pH 6.3; clear, wavy lower boundary; 4 to 8 inches thick.

B_{21} 10 to 23 inches, clay of the same color as the A horizon; strong, very coarse prisms that break to weak, coarse blocks; extremely hard when dry, firm when moist, very plastic and very sticky when wet; moderate, continuous clay films; very few hard shot concretions ⅛ inch in diameter; common fine roots; slightly acid, pH 6.2; clear, wavy lower boundary; 8 to 15 inches thick.

B_{22} 23 to 34 inches, clay of the same color as the A horizon; moderate, very coarse prisms that break to weak, coarse and medium blocks; extremely hard when dry, very firm when moist, very plastic and very sticky when wet; moderately thick, continuous clay films; occasional hard, black concretions (shot) about ⅛ inch in diameter; few roots; many slickensides; slightly acid, pH 6.5; clear, irregular lower boundary; 9 to 15 inches thick.

B_3 34 to 45 inches, mottled dark-gray and light yellowish-brown (2.5Y 4/1 and 6/3) clay; very dark gray and olive brown (2.5Y 3/1 and 4/3) when moist; common fine, white specks of quartz grains; weak, coarse prisms that break to moderate, medium blocks; extremely hard when dry, firm when moist, very plastic and very sticky when wet; moderate, continuous clay films; common slickensides; tongues of B_2 horizon penetrate this horizon; very few fine roots; neutral, pH 7.0; clear, wavy lower boundary; 10 to 18 inches thick.

C_1 45 to 52 inches, olive (5Y 5/3), heavy clay loam; darker olive (5Y 4/3) when moist; common, fine and medium mottles of black, yellowish brown, and white; weak, coarse prisms that break to weak, medium, fine and very fine blocks; very hard when dry, firm when moist, very plastic and sticky when wet; moderate, continuous clay films; common slickensides; very few fine roots; neutral, pH 7.3; clear, wavy lower boundary; 6 to 12 inches thick.

C_2 52 to 61 inches, pale-olive (5Y 6/3) silty clay loam; olive (5Y 4/3) when moist; few, medium mottles of black, and common, fine mottles of yellowish brown and white; moderate, coarse prisms that break to moderate, coarse and medium blocks; very hard when dry, firm when moist, very plastic and sticky when wet; moderately developed clay films on vertical surfaces; many root holes are lined and filled with dark-colored clay; slickensides common; mildly alkaline, pH 7.5; (noncalcareous); abrupt, smooth lower boundary; 0 to 15 inches thick.

D_g 61 inches +, light olive-brown (2.5Y 5/3) loam, (2.5Y 4/3) when moist with few, medium, black mottles and common, fine, yellowish-brown and white mottles; massive, with common, widely spaced, vertical cleavages; soil along cleavage planes has prominent, dark olive-brown clay films; tubular pores are lined with clay; hard when dry, friable when moist, plastic and sticky when wet; neutral, pH 7.3.

Dublin clay: About 300 yards east of San Gregorio and 100 yards south of highway.

A_{11} 0 to 12 inches, very dark gray (10YR 3/1) clay; black (10YR 2/1) when moist; massive when moist, but on thorough drying forms strong, fine and medium, subangular blocks; very hard when dry, friable when moist, sticky and plastic when wet; abundant fine roots; medium organic-matter content; mildly alkaline, pH 7.5; diffuse, smooth lower boundary; 8 to 16 inches thick.

A_{12} 12 to 43 inches, similar in color to horizon above; massive when moist, cracks widely on drying and breaks into large, irregular blocks that continue to break upon further drying and shrinking; extremely hard when dry, very firm when moist, very plastic and sticky when wet; many fine roots; medium organic-matter content; numerous slickensides; slightly acid, pH 6.5; diffuse, smooth lower boundary; 20 to 40 inches thick.

C_1 43 to 50 inches, gray (2.5Y 5/1), heavy clay loam; dark gray (2.5Y 4/1) when moist; massive, but breaks to coarse, angular blocks on drying; extremely hard when dry, very firm when moist, plastic and sticky when wet; few roots; moderately alkaline, pH 8.0, but noncalcareous; gradual, smooth lower boundary; 4 to 10 inches thick.

C_2 50 inches +, light olive-brown (2.5Y 5/3) clay loam; olive brown (2.5Y 4/3) when moist; massive; very hard when dry, firm to friable when moist; moderately alkaline, pH 8.0, but noncalcareous; many feet thick.

Elkhorn sandy loam on a terrace northwest of the radio transmitter that is about 1½ miles south of Pescadero Creek, near Pescadero.

A_{11} 0 to 4 inches, gray (10YR 5/1) sandy loam; very dark gray (10YR 3/1) when moist; weak, medium, granular structure; slightly hard when dry, friable when moist; abundant fine roots; porous; moderately alkaline, pH 8.0 (probably high because of recent burning); abrupt, smooth lower boundary.

A_{12} 4 to 7 inches, dark-gray (10YR 4/1) sandy loam; very dark gray (10YR 3/1) when moist; very weak, fine, granular structure; slightly hard when dry, friable when moist; abundant fine roots; porous; slightly acid, pH 6.3; clear, smooth lower boundary. (Horizons A_{11} and A_{12} are probably overburden from road construction.)

A_{13} (or A_1) 7 to 30 inches, dark-gray (10YR 4/1) sandy loam; black (10YR 2/1) when moist; very weak, very coarse, prismatic structure, or massive; slightly hard when dry, friable when moist; abundant fine roots; moderately low in organic-matter content; finely porous; medium acid, pH 6.0; gradual, wavy lower boundary; A horizon is usually 12 to 25 inches thick.

B_2 30 to 44 inches, strong-brown (7.5YR 5/6) sandy clay loam; strong brown (7.5YR 4/6) when moist; weak, coarse, prismatic and moderate, medium, subangular blocky structure; very hard when dry, firm when moist, plastic and sticky when wet; many, coarse, conspicuous mottles that are dark brown (7.5YR 3/2) when moist; a very few iron concretions, ¼ inch in diameter, in the upper 8 inches of the horizon; few fine roots; low organic-matter content; few fine pores; moderately thick, continuous clay films on faces of peds and in pores; medium acid, pH 5.8; gradual, smooth lower boundary; 10 to 18 inches thick.

B_{31} 44 to 53 inches, mottled brown, strong-brown, and light yellowish-brown with some black staining (7.5YR 5/4 and 5/6, 10YR 6/4 and 2/0) sandy clay loam; mottled dark brown, strong brown, yellowish brown, and black (7.5YR 4/4 and 4/6, 10YR 5/4 and 2/0) when moist; moderate, medium, subangular blocky structure; very hard when dry, friable when moist, and plastic and sticky when wet; moderately porous; moderately thick, nearly continuous clay films on faces of peds and in pores; medium acid, pH 6.0; gradual, smooth lower boundary.

B_{32} 53 to 63 inches +, similar to the horizon just above but slightly acid, pH 6.3; in most places the B_3 horizon is more than 20 inches thick, and the solum generally exceeds 60 inches in thickness.

Farallone coarse sandy loam: 0.2 mile east of State Highway No. 1, and about 1 mile north of the village of Half Moon Bay.

A_1 0 to 20 inches, dark-gray (10YR 4/1) coarse sandy loam; black (10YR 2/1) when moist; weak, coarse, granular structure; slightly hard when dry, friable when moist; common fine roots; porous; micaceous; slightly acid, pH 6.4; gradual, smooth lower boundary; 14 to 24 inches thick.

AC 20 to 48 inches, dark-gray (10YR 4/1) coarse sandy loam; very dark gray (10YR 3/1) when moist; very weak, medium and fine, subangular blocky structure; slightly hard when dry, friable when moist; few fine roots; porous; micaceous; slightly acid, pH 6.3; diffuse lower boundary; 20 to 35 inches thick.

C 48 inches +, dark grayish-brown (10YR 4/2) stratified sandy loam and coarse sandy loam; very dark grayish brown (10YR 3/2) when moist; massive; slightly hard when dry, friable when moist; porous; high in mica and quartz; slightly acid, pH 6.3; many feet thick.

Gazos silt loam: About 5 feet north of road cut along Gazos Creek Road, 1½ miles east of State Highway No. 1.

A_{11} 0 to 12 inches, grayish-brown (10YR 5/2) silt loam; very dark grayish brown (10YR 3/2) when moist; moderate, coarse, medium and fine, granular structure; hard when dry, friable when moist, slightly sticky and slightly plastic when wet; numerous roots; many rodent burrows; porous; common, weathered shale particles less than ¼ inch in diameter; neutral, pH 6.8; gradual, smooth lower boundary; 8 to 15 inches thick.

A_{12} 12 to 25 inches, similar to the horizon above except that texture is light silty clay loam; very hard when dry, friable when moist, and sticky and plastic when wet; slightly acid, pH 6.5; abrupt, irregular lower boundary; 10 to 15 inches thick.

D_r 25 inches +, light-gray (5Y 7/2), semihard, fractured Purisima shale, olive gray (5Y 5/2) when moist; fragments of shale stained yellowish brown; noncalcareous.

Hugo fine sandy loam: 850 feet east of the intersection of Swett and Double K Ranch Roads, 4.9 miles north of Sky Londa along Highway No. 5, and 2.35 miles southwest along Swett Road.

A_{00} and A_0 2 to 0 inches of fresh and rotting leaves, needles, and twigs; very dark colored; abrupt, smooth lower boundary.

A_1 0 to 8 inches, pale-brown (10YR 6/3) fine sandy loam; brown (10YR 4/3) when moist; whitish mycelia along root channels; weak, fine, granular structure; slightly hard when dry, very friable when moist, nonsticky and nonplastic when wet; many wormcasts; common medium-sized and fine roots; gradual, wavy lower boundary.

$(B)_{21}$ 8 to 26 inches, very pale brown (10YR 7/4) gravelly sandy loam; brown (7.5YR 5/5) when moist; strong brown (7.5YR 5/8) when moist, iron-oxide stainings; very weak, medium, subangular blocky structure; slightly hard when dry, very friable when moist, nonsticky and nonplastic when wet; few very thin, very discontinuous clay films; common medium-sized and fine roots; diffuse lower boundary.

$(B)_{22}$ 26 to 40 inches, very pale brown (10YR 7/4) gravelly sandy loam; brown (7.5YR 5/5) when moist; very weak, coarse, subangular blocky structure; slightly hard when dry, very friable when moist, nonsticky and nonplastic when wet; few very thin, discontinuous clay films; common medium-sized and fine roots; abrupt, irregular lower boundary.

D_r 40 inches +, yellow (10YR 7/6), soft sandstone (Vaqueros formation); yellowish brown (10YR 5/5) when moist, with thin, discontinuous, reddish-brown clay films on surfaces of shattered fragments of sandstone; nearly massive at greater depth.

Josephine sandy loam: 4.9 miles north of Sky Londa along State Highway No. 5 (Skyline Boulevard); thence 2.35 miles in a southerly direction along Swett Road to the junction with Double K Ranch Road; thence 600 feet in an easterly direction to a cut on north side of logging trail; elevation about 2,000 feet.

A_{00} and A_0 2 to 0 inches of litter of fresh leaves, needles, and twigs overlying partly decomposed residues; abrupt, smooth lower boundary; 1 to 3 inches thick.

A_1 0 to 5 inches, light yellowish-brown (10YR 6/4; sandy loam; brown (7.5YR 4/3) when moist) common, medium, faint mottles of brown (10YR 5/3); dark grayish brown (10YR 4/2) when moist; moderate, fine, granular structure; slightly hard when dry, friable when moist; common fine and medium-sized roots, and a few large roots; many fine pores; common wormcasts; few fine, dark-red pieces of shot (1 to 3 millimeters in diameter); slightly acid, pH 6.3; gradual, wavy lower boundary; 3 to 8 inches thick.

A_3 5 to 12 inches, light-brown (7.5YR 6/4) sandy loam; brown (7.5YR 5/4) when moist; very weak, fine, granular structure; hard when dry, friable when moist; common fine and medium-sized roots, and a few large roots; many fine pores; few fine pieces of shot; medium acid, pH 6.0; gradual, wavy lower boundary; 5 to 12 inches thick.

B_1 12 to 19 inches, light-brown (7.5YR 6/4), heavy sandy loam; brown (7.5YR 5/4) when moist; weak, medium, subangular blocky structure; hard when dry, friable when moist, slightly sticky when wet; common fine and medium-sized roots; porous; thin, discontinuous clay films in pores and on faces of peds; few fine pieces of shot; numerous pebbles and fragments of sandstone; medium acid, pH 6.0; gradual, wavy lower boundary; 6 to 12 inches thick.

B_{21} 19 to 31 inches, reddish-yellow (7.5YR 6/5) clay loam; strong brown (7.5YR 5/5) when moist; weak, medium, subangular blocky structure; hard when dry, friable when moist, slightly sticky and slightly plastic when wet; common fine and medium-sized tree roots, few large tree roots; common fine and few coarse, discontinuous pores; common, nearly continuous, reddish-brown clay films on faces of peds; numerous pebbles and fragments of sandstone; medium acid, pH 5.9; diffuse lower boundary; 10 to 20 inches thick.

B_{22} 31 to 43 inches, reddish-yellow (7.5YR 7/5), heavy loam; strong brown (7.5YR 5/5) when moist; weak, medium, subangular blocky structure; hard when dry, friable when moist, slightly sticky and slightly plastic when wet; common fine and medium-sized roots, few large roots; common fine and few coarse, tubular pores; thin, discontinuous, strong-brown and yellowish-red clay films on faces of peds and in pores; many pebbles and soft fragments of decomposing sandstone; medium acid, pH 6.0; clear, irregular lower boundary; 10 to 20 inches thick.

D_r 43 inches +, predominantly light yellowish-brown (10YR 6/4), soft, weathered sandstone; yellowish brown (10YR 5/4) when moist; reddish-brown clay films on surfaces of fractured pieces; shattered and fractured in upper part and some mixing with material from B_{22} horizon in cracks; more massive at greater depth.

Laughlin loam: Along State Highway No. 5, ¼ mile north of the junction with Alpine Road.

A_{11} 0 to 3 inches, grayish-brown (10YR 5/2) loam; very dark grayish brown (10YR 3/2) when moist; moderate, fine, granular structure; slightly hard when dry, friable when moist; abundant fine roots; many fine pores; numerous wormcasts and rodent diggings; medium acid, pH 6.0; clear, smooth lower boundary; 2 to 4 inches thick.

A_{12} 3 to 26 inches, same color as the horizon above; silt loam to loam; weak, medium, subangular blocky structure; hard when dry, friable when moist; common fine roots; many fine pores; numerous wormcasts; few rodent burrows; medium acid, pH 6.0; abrupt, irregular lower boundary; 8 to 60 inches thick.

D$_r$ 26 inches +, light brownish-gray (10YR 6/2) Monterey shale; very dark grayish brown (10YR 3/2) when moist; fractured; reddish-brown stains on fracture planes.

Lobitos clay loam: 1 mile northeast of Lobitos on north side of Irish Ridge Road.

A$_{00}$ and A$_0$ ½ to 1 inch of loose, dark-colored, fresh and rotting twigs, leaves, and grass; abrupt, smooth lower boundary; ½ to 1 inch thick.

A$_{11}$ 0 to 9 inches, dark grayish-brown (10YR 4/2) loam; very dark brown (10YR 2/2) when moist; weak, medium and fine, subangular blocky structure; hard when dry, friable when moist, slightly plastic and nonsticky when wet; abundant fine roots; many fine pores; few wormcasts; medium acid, pH 5.9; clear, wavy lower boundary.

A$_{12}$ 9 to 18 inches, dark grayish-brown (10YR 4/2) loam; very dark grayish brown (10YR 3/2) when moist; weak, medium and fine, subangular blocky structure; hard when dry, friable when moist, slightly plastic and nonsticky when wet; abundant roots; many fine pores; few fragments of rock; medium acid, pH 5.9; clear, wavy lower boundary.

B$_2$ 18 to 29 inches, light olive-brown (2.5Y 5/4) gravelly clay loam; olive brown (2.5Y 4/4) when moist; hard when dry, firm when moist, plastic and slightly sticky when wet; plentiful fine roots; common fine pores; common thin, discontinuous, olive-colored clay films; many weathered, angular rock fragments; medium acid, pH 5.8; clear, wavy lower boundary.

C 29 to 34 inches, light olive-brown (2.5Y 5/4) gravelly loam; olive brown (2.5Y 4/4) when moist; massive; hard when dry, friable when moist, very slightly plastic and nonsticky when wet; few fine roots; many angular, weathered fragments of rock; medium acid, pH 5.8; clear, wavy lower boundary.

D$_r$ 34 inches +, light olive-brown (2.5Y 5/4), coarsely angular, slightly weathered fragments of silty Purisma sandstone or shale and some loosened soil material; olive brown (2.5Y 4/4) when moist; many feet thick.

Lockwood loam, brown subsoil variant: Along Coast Highway adjacent to Ano Nuevo Creek.

A$_1$ 0 to 26 inches, grayish-brown (10YR 5/2) loam; very dark brown (7.5YR 2/2) when moist; moderate, medium, subangular blocky structure; slightly hard when dry, friable when moist; abundant fine roots and fine pores; strongly acid, pH 5.2; gradual, smooth lower boundary; 10 to 30 inches thick.

B$_1$ 26 to 36 inches, very pale brown (10YR 7/3) clay loam; brown (7.5YR 4/3) when moist; weak, medium, subangular blocky structure; very hard when dry, firm when moist, and slightly plastic and sticky when wet; common fine roots; abundant fine pores; few thin, discontinuous clay films; strongly acid, pH 5.5; gradual, smooth lower boundary; 5 to 13 inches thick.

B$_2$ 36 to 48 inches, light yellowish-brown (10YR 6/4), heavy clay loam; strong brown (7.5YR 4/6) when moist; nearly massive; very hard when dry, firm when moist, and slightly plastic and sticky when wet; common moderately thick clay films in pores and on bridges between sand grains; a few fine roots; common fine, interstitial pores; strongly acid, pH 5.5; gradual, smooth lower boundary; 9 to 15 inches thick.

B$_3$ 48 to 60 inches +, light yellowish-brown (10YR 6/4) clay loam containing nearly white (10YR 8/2), soft fragments of shale; strong brown and light brownish gray (7.5YR 4/6 and 10YR 6/2) when moist; massive; very hard when dry, firm when moist, and slightly plastic and slightly sticky when wet; few thin, discontinuous clay films in pores; common fine, interstitial pores. strongly acid, pH 5.5; few inches to several feet thick;

Lockwood shaly loam: In Little Butano Creek Canyon, ¼ mile south of bridge on Cloverdale Road over Butano Creek.

A$_1$ 0 to 20 inches, grayish-brown (10YR 5/2) shaly loam; very dark grayish brown (10YR 3/2) when moist; weak, very fine, subangular blocky structure; very hard when dry, friable when moist; abundant fine roots and fine pores; medium acid, pH 6.0; abrupt, smooth lower boundary; 15 to 25 inches thick.

B$_2$ 20 to 42 inches, grayish-brown (10YR 5/2), shaly, heavy loam with a few, faint, medium mottles of yellowish brown (10YR 5/4); mottles dark grayish brown (10YR 4/2) when moist; nearly massive; very hard when dry, friable when moist, slightly plastic and slightly sticky when wet; common thin, discontinuous clay films in pores and on bridges; common fine roots and fine pores; slightly acid, pH 6.5; gradual, smooth lower boundary; 15 to 30 inches thick.

C 42 to 60 inches, light grayish-brown (10YR 6/2) shaly clay loam with common, medium, distinct mottles of reddish brown (5YR 4/4); dark grayish brown (10YR 4/2) mottled with dark reddish brown (5YR 3/4) when moist; massive; very hard when dry, friable when moist, slightly plastic and slightly sticky when wet; few fine roots; common fine pores; slightly acid, pH 6.5; many feet thick.

Los Gatos loam: On Bovet Ranch, in Los Trancos Creek area, ½ mile south of junction of Portola and Alpine Roads.

A$_{00}$ 1 to 0 inch of accumulation of fresh and somewhat decayed leaves.

A$_1$ 0 to 3 inches, dark reddish-brown (5YR 3/3) loam; dark reddish brown (5YR 2/2) when moist; strong, fine, granular structure; slightly hard when dry, friable when moist, slightly plastic and slightly sticky when wet; abundant fine roots; porous with many insect holes; many small, angular fragments of stone; neutral, pH 7.0; clear, wavy lower boundary; 2 to 6 inches thick.

A$_3$ 3 to 15 inches, heavy loam; colors similar to those of the horizon above; coarse, subangular blocky structure crushing to coarse granular; slightly hard when dry, friable when moist, slightly sticky and slightly plastic when wet; common fine and medium roots; common insect holes and fine pores; many small, angular fragments of stone; slightly acid, pH 6.5; gradual, wavy lower boundary; 8 to 20 inches thick.

B$_2$ 15 to 22 inches, dark-red (2.5YR 3/6) gritty clay loam, dark reddish brown (2.5YR 3/4) when moist; weak, fine, subangular blocky structure; slightly hard when dry, friable when moist, slightly plastic and slightly sticky when wet; few moderately thick, continuous clay films in tubular pores and on some faces of peds; neutral, pH 6.8; abrupt, irregular lower boundary; 6 to 12 inches thick.

D$_r$ 22 inches +, bedded, reddish-brown, metamorphosed sedimentary rock that is blue at greater depth; many feet thick.

Mindego clay loam: About 50 feet northeast of bridge across La Honda Creek, 1 mile northeast of village of La Honda.

A$_{11}$ 0 to 2 inches, very dark gray (10YR 3/1) clay loam; very dark brown (10YR 2/2) when moist; moderate, coarse and medium, granular structure; very hard when dry, friable when moist, plastic and sticky when wet; high content of organic matter; many fine roots; porous; many wormcasts; neutral, pH 7.3; clear, smooth lower boundary; ½ to 3 inches thick.

A$_{12}$ 2 to 10 inches, very dark gray (10YR 3/1), heavy clay loam; very dark brown (10YR 2/2) when moist; moderate, fine and very fine, subangular blocky structure; very hard when dry, friable when moist, plastic and sticky when wet; numerous fine roots and insect burrows; few thin, patchy clay films, especially on vertical surfaces of peds; neutral, pH 7.3; gradual, smooth lower boundary; 4 to 11 inches thick.

B_2 10 to 30 inches, very dark grayish-brown (10YR 3/2) clay; very dark brown (10YR 2/2) when moist; moderate, fine and very fine, subangular blocky structure; extremely hard when dry, firm when moist, very plastic and sticky when wet; nearly continuous, thin clay films; many roots; slightly acid, pH 6.5; gradual, smooth lower boundary; 10 to 30 inches thick.

B_3 30 to 46 inches, very dark grayish-brown (10YR 3/2) stony clay loam; very dark brown (10YR 3/3) when moist; weak, very fine subangular blocky structure; hard when dry, friable when moist, very plastic and very sticky when wet; moderately thick, continuous clay films; many large roots; numerous soft basalt cobbles and stones; slightly acid, pH 6.5; clear, irregular, lower boundary; 8 to 20 inches thick.

D_r 46 inches +, weathered, fractured basalt bedrock that is harder and more massive with increasing depth; upper part has been penetrated by large tree roots; soft, weathered rock in upper part has pH of 7.3; many feet thick.

Miramar coarse sandy loam: About 60 feet north of State Highway No. 1, on a steep hillside, at a point 2 miles north of village of Montara (about 1 mile south of the "Devil's Slide," or ½ mile north of the survey area).

A_{11} 0 to 5 inches, grayish-brown (10YR 5/2) coarse sandy loam; very dark brown (10YR 2/2) when moist; weak, coarse, granular structure; hard when dry; friable when moist, nonplastic and nonsticky when wet; medium organic-matter content; many fine roots; porous; slightly acid, pH 6.5; clear, smooth lower boundary; 3 to 8 inches thick.

A_{12} 5 to 22 inches, coarse sandy loam of about the same color as the A_{11} horizon; weak, medium, subangular blocky structure; hard when dry, friable when moist, slightly plastic and nonsticky when wet; medium organic-matter content; many fine roots; porous; slightly acid, pH 6.5; abrupt, wavy lower boundary; 4 to 20 inches thick.

B_2 22 to 37 inches, light-brown (7.5YR 6/5) coarse sandy clay loam; strong brown (7.5YR 5/6) when moist; moderate, medium and coarse, irregular, angular blocky structure; very hard when dry, friable when moist, plastic and sticky when wet; common fine roots and few medium-sized roots; common fine pores; distinct, continuous clay films of dark reddish-brown color (moist); slightly acid, pH 6.5; gradual, smooth lower boundary; 3 to 20 inches thick.

C_2 and D_r 37 inches +, brown (7.5YR 5/4) weathered quartz diorite that crushes easily when moist to coarse loamy sand; dark brown (7.5YR 4/4) when moist; colors are variegated because of coarse grains of mica, quartz, and feldspar; many discontinuous clay films on mineral grains; slightly acid, pH 6.5; at depths of more than 10 feet, this material grades to hard, slightly weathered quartz diorite.

Montara stony loam: 1 mile northeast of Pilarcitos Lake, near the center of the northwest quarter of section 20, township 4 south, range 5 west.

A_{11} 0 to 6 inches, dark grayish-brown (10YR 4/2) stony loam; very dark gray (10YR 3/1) when moist; moderate, medium, subangular blocky structure; very hard when dry, friable when moist; abundant roots and pores; many angular stones and cobbles; neutral; gradual, smooth lower boundary; 3 to 8 inches thick.

A_{12} 6 to 15 inches, dark grayish-brown (10YR 4/2) stony clay loam; very dark gray (10YR 3/1) when moist; moderate, medium, subangular blocky structure; very hard when dry, firm when moist; common roots; few pores; numerous angular stones and cobbles; neutral; abrupt, irregular lower boundary; 2 to 12 inches thick.

D_r 15 inches +, greenish, unweathered or slightly weathered serpentine rock.

Pomponio loam: About 10 feet southeast of the highest, or most eastern, street in the village of Cuesta La Honda.

A_1 0 to 8 inches, gray (10YR 5/1), heavy loam; very dark gray (10YR 3/1) when moist; weak, coarse, granular structure; very hard when dry, friable when moist, plastic and sticky when wet; many fine roots; many wormcasts and rodent burrows; slightly acid, pH 6.2; gradual, smooth lower boundary; 5 to 10 inches thick.

A_2 8 to 21 inches, lighter gray (10YR 5/1), heavy loam; very dark gray (10YR 3/1) when moist; weak, medium and fine, subangular blocky structure; extremely hard when dry, friable when moist, plastic and sticky when wet; numerous roots, wormholes, and insect holes; slightly acid, pH 6.2; abrupt, smooth lower boundary; 10 to 16 inches thick.

B_2 21 to 30 inches, grayish-brown (10YR 5/2) clay; dark grayish brown (10YR 4/2) when moist; moderate, coarse and medium, angular blocky structure; extremely hard when dry, firm when moist, very plastic and very sticky when wet; dense and compact in place; moderate, continuous clay films; a few large roots penetrate this horizon; slightly acid, pH 6.5; clear, smooth lower boundary; 8 to 12 inches thick.

C_2 and D_r 30 inches +, grayish-brown (10YR 5/2), heavy clay loam; dark grayish brown (10YR 4/2) when moist; the clay loam fills interstices in fractured, white (2.5Y 8/2), moderately hard, shattered shale of the Purisima formation that is light yellowish brown (2.5Y 6/3) when moist; neutral, pH 6.7; shale is harder, darker, and has fewer interstices with increasing depth.

Santa Lucia shaly loam: On hill south and across from the quarry on San Mateo Road.

A_{11} 0 to 6 inches, gray (10YR 5/1) shaly loam; very dark gray (10YR 3/1) when moist; weak, medium, subangular blocky and weak, fine, granular structure; hard when dry, friable when moist; abundant fine roots; porous; slightly acid, pH 6.3; gradual, smooth lower boundary; 2 to 12 inches thick.

A_{12} 6 to 14 inches, similar to surface soil, but structure is moderate, medium, subangular blocky, and reaction is strongly acid, pH 5.5; abrupt, smooth lower boundary; 2 to 16 inches thick.

C 14 to 20 inches, grayish-brown (10YR 5/2) very shaly loam; very dark grayish brown (10YR 3/2) when moist; common fragments of shale and staining of light yellowish brown (10YR 6/4); very dark brown (7.5YR 3/4) when moist; essentially massive; hard when dry, friable when moist; few fine roots; porous; very strongly acid, pH 5.0; abrupt, irregular lower boundary; 0 to 12 inches thick.

D_r 20 inches +, very pale brown (10YR 7/3), stained with yellowish red (5Y 5/6), shattered siliceous shale; brown (10YR 5/3) and dark red (2.5YR 3/6) when moist; very strongly acid, pH 5.0; many feet thick.

Sheridan sandy loam: 150 yards southwest of Stone Dam, along the flume on Pilarcitos Creek.

A_{00} and A_0 2 to 0 inches of fresh and partially decomposed forest litter.

A_1 0 to 5 inches, very dark grayish-brown (10YR 3/2), gritty sandy loam; very dark brown (10YR 2/2) when moist; strong, medium, granular structure; soft when dry, friable when moist; high in organic matter; abundant roots; porous with many insect holes and wormcasts; neutral, pH 7.0; clear, irregular lower boundary; 3 to 10 inches thick.

C_1 5 to 20 inches, brown (10YR 4/3) gritty sandy loam; dark grayish brown (10YR 3/2) when moist; weak, medium, subangular blocky structure; slightly hard when dry, very friable when moist; common fine and medium-sized roots and pores; neutral, pH 6.7; diffuse, wavy lower boundary; 4 to 25 inches thick.

C_2 20 to 38 inches, brown (10YR 4/3) gritty sandy loam; dark grayish brown (10YR 3/2) when moist; moderate, medium, subangular blocky structure; slightly hard when dry, friable when moist; few fine and medium-sized roots; slightly acid, pH 6.5; abrupt, irregular lower boundary; 12 to 24 inches thick.

D_r 38 inches +, speckled very pale brown and very dark gray, weathered quartz diorite with yellowish-red staining; few stones; micaceous.

Soquel loam: About ½ mile east of State Highway No. 1 on the north side of Higgins Canyon Road and 1 mile southeast of the center of Half Moon Bay.

A_{11} 0 to 22 inches, very dark gray (10YR 3/1), heavy loam; black (10YR 2/1) when moist; weak, fine, granular structure; slightly hard when dry, friable when moist; abundant fine roots; high in organic matter; finely porous; neutral, pH 6.7; diffuse lower boundary; 12 to 30 inches thick.

A_{12} 22 to 30 inches, dark-gray (10YR 4/1) loam; nearly black (10YR 2/1) when moist; weak, fine, blocky structure; hard when dry, friable when moist; common fine roots; medium organic-matter content; many fine, tubular pores; neutral, pH 6.7; gradual, smooth lower boundary; 5 to 15 inches thick.

A_{1b} 30 to 60 inches, dark grayish-brown (10YR 4/2) loam; very dark grayish brown (10YR 3/2) when moist; massive; hard when dry, friable when moist; common fine roots; moderately low organic-matter content; many fine, tubular pores; few thin, discontinuous clay films; slightly acid, pH 6.5; diffuse lower boundary; 20 to 40 inches thick.

B_{2b} 60 inches +, grayish-brown (10YR 5/2) loam; very dark grayish brown (10YR 3.5/2) when moist; massive; hard when dry, friable when moist; few fine roots; many fine, tubular pores with thin, continuous, dark grayish-brown clay films lining the larger pores; somewhat stratified; slightly acid, pH 6.5; several feet thick.

Sweeney clay loam: About 40 feet south of State Highway No. 5 (Skyline Highway), at a point 4.5 miles south of Sky Londa.

A_1 0 to 7 inches, dark grayish-brown (10YR 4/2) clay loam; very dark brown (10YR 2.5/2) when moist; moderate, medium, granular structure; hard when dry, friable when moist, plastic and slightly sticky when wet; many fine roots; many worm burrows, common krotovinas; slightly acid, pH 6.4; clear, smooth lower boundary; 4 to 12 inches thick.

B_2 7 to 16 inches, dark grayish-brown (10YR 4/2) sandy clay loam that contains distinctly more clay than the A_1 horizon; very dark brown (10YR 2/2) when moist; moderate, medium, prismatic structure, but these peds break to moderate, medium, subangular blocky structure; very hard when dry, firm when moist, plastic and sticky when wet; thin, continuous clay films on vertical faces of peds; many fine roots; moderate number of wormcasts and krotovinas; slightly acid; pH 6.3; clear, wavy lower boundary; 8 to 16 inches thick.

B_3 16 to 22 inches, indistinctly mottled brown and dark grayish-brown (10YR 4/3 and 4/2), light sandy clay loam; dark brown and very dark grayish brown (10YR 3/3 and 3/2) when moist; weak, medium and fine, subangular blocky structure; very hard when dry, firm when moist, plastic and slightly sticky when wet; thin, dark, patchy clay films on vertical faces of peds; common fine roots; common krotovinas; neutral, pH 6.7; clear, wavy or irregular lower boundary; 3 to 10 inches thick.

C_1 22 to 33 inches, mottled yellowish-brown and dark-brown (10YR 5/4 and 3/3) fine sandy loam; dark yellowish brown and very dark brown (10YR 4/4 and 2/2) when moist; very weak, medium, subangular blocky structure; nearly massive; very hard when dry, firm when moist, and slightly plastic and nonsticky when wet; few thin, patchy clay films on vertical surfaces; few fine roots; neutral, pH 6.7; gradual, wavy lower boundary; 6 to 14 inches thick.

C_2 33 to 57 inches, mottled yellowish-brown, dark-brown, and pale-yellow (10YR 5/4, 3/3, and 2.5Y 7/4) fine sandy loam; dark yellowish brown, very dark brown, and light olive brown (10YR 4/4, 2/2, and 2.5Y 5/4) when moist; lower part of the horizon is sandy loam; massive; very hard when dry, firm when moist; neutral, pH 7.0; grades to hard diabase at depth of 5 to 7 feet.

Tierra fine sandy loam: 1 mile south of Tunitas Creek along State Highway No. 1 (the New Coast Highway) and 300 yards east.

A_{1p} 0 to 7 inches, very dark gray (10YR 3/1) fine sandy loam; black (10YR 2/1) when moist; weak, coarse and medium, granular structure; slightly hard when dry, friable when moist, and slightly plastic and nonsticky when wet; roots very numerous; slightly porous; many wormcasts; strongly acid, pH 5.2; abrupt, smooth lower boundary.

A_{12} 7 to 13 inches, fine sandy loam of the same color as the A_{1p} horizon; weak, coarse and medium, granular structure; hard when dry, friable when moist, and slightly plastic and nonsticky when wet; roots very numerous; peds are moderately porous; very many wormcasts; strongly acid, pH 5.5; clear, slightly wavy lower boundary; A_1 horizon is 9 to 21 inches thick.

A_{21} 13 to 17 inches, very dark gray (10YR 3/1) fine sandy loam; black (10YR 2/1) when moist; weak, coarse and medium, granular structure; hard when dry, friable when moist, and slightly plastic and nonsticky when wet; roots are numerous; peds are moderately porous; common, medium and fine mottles of light gray; strongly acid, pH 5.5; clear, wavy lower boundary.

A_{22} 17 to 21 inches, dark-gray (10YR 4/1) fine sandy loam; nearly black (10YR 2/1) when moist; weak, medium and fine, subangular blocky structure; hard when dry, friable when moist, slightly plastic and nonsticky when wet; roots common; moderately porous; common, medium and fine mottles of light gray; medium acid, pH 5.7; abrupt, wavy lower boundary; A_2 horizon is 1 to 15 inches thick.

B_{21} 21 to 30 inches, dark grayish-brown (10YR 4/2), heavy clay loam; very dark grayish brown (10YR 3/2) when moist; moderate, coarse, prismatic, breaking to moderate, medium, blocky structure; extremely hard when dry, firm when moist, very plastic and sticky when wet; moderately thick, continuous clay films; has a few, conspicuous, white spots that are probably gypsum; very few roots; peds are nonporous; slightly acid, pH 6.2; clear, wavy lower boundary; 5 to 12 inches thick.

B_{22} 30 to 41 inches, light olive-brown (2.5Y 5/3), heavy clay loam; olive brown (2.5Y 4/3) when moist; moderate, medium, blocky structure; extremely hard when dry, firm when moist, very plastic and sticky when wet; moderately thick, continuous clay films; very few roots; peds are nonporous; common, fine, black mottles and a few conspicuous, medium, white spots (probably gypsum); slightly acid, pH 6.5; clear, wavy lower boundary; 8 to 18 inches thick.

B_{23} 41 to 50 inches, finely mottled, light brownish-gray and yellowish-brown (2.5Y 6/2 and 10YR 5/6) sandy clay loam; grayish brown and dark yellowish brown (2.5Y 5/2 and 10YR 4/6) when moist; weak, coarse, blocky structure; extremely hard when dry, firm when moist, very plastic and sticky when wet; moderately thick, continuous clay films; very few roots; peds are nonporous; contains krotovinas that are black in color; a few conspicuous, medium spots of white; neutral, pH 6.8; gradual, smooth lower boundary; 8 to 30 inches thick.

C_1 50 to 60 inches +, finely mottled light brownish-gray and yellowish-brown (2.5Y 6/2 and 10YR 5/4) sandy clay loam; grayish brown and dark yellowish brown (2.5Y 5/2 and 10YR 4/4) when moist; very weak, coarse, blocky structure; almost massive; very hard when dry, firm when moist, very plastic and sticky when wet; thin, patchy clay films; very few roots; very slightly porous; slightly acid, pH 6.5; many feet thick.

Tierra fine sandy loam, acid variant: 1½ miles northeast of Pigeon Point lighthouse near the radio receiving station.

A_1 0 to 12 inches, grayish-brown (10YR 5/2) fine sandy loam; very dark grayish brown (10YR 3/2) when moist; weak, fine, granular structure; slightly hard when dry, friable when moist; abundant fine roots and pores; strongly acid, pH 5.4; gradual, smooth lower boundary; 12 to 16 inches thick.

A_3 (or A_2) 12 to 20 inches, light olive-brown (2.5Y 5/4), heavy fine sandy loam; dark brown (10YR 3/3) when moist; weak, fine, subangular blocky structure; very hard when dry, friable when moist, slightly plastic when wet; occasional dark, rounded concretions; common fine roots; many fine pores; very strongly acid, pH 5.0; clear, smooth lower boundary; 4 to 10 inches thick.

B_1 20 to 31 inches, yellowish-brown (10YR 5/5) sandy clay loam; dark yellowish brown (10YR 4/4) when moist; moderate, medium, subangular blocky structure; very hard when dry, friable when moist, plastic and slightly sticky when wet; few fine roots; many fine pores; few thin, discontinuous clay films; colloid mainly in bridges between grains of sand; strongly acid, pH 5.3; abrupt, smooth lower boundary; 8 to 20 inches thick.

B_2 31 to 54 inches, mottled yellowish-brown and light brownish-gray (10YR 5/6 and 6/2) clay or gravelly clay; dark yellowish brown and brownish gray (10YR 4/4 and 5/2) when moist; weak, medium, prismatic structure grading to medium blocky with increasing depth; very hard when dry, firm when moist, very plastic and sticky when wet; colloid mainly in bridges between grains of sand and gravel; common fine concretions; strongly acid, pH 5.3; gradual, smooth lower boundary; 15 to 30 inches thick.

B_3 54 to 60 inches +, mottled and streaked yellowish-red and white (5YR 5/6 and 10YR 8/1) sandy clay loam or sandy clay; dark reddish brown, white, and yellowish brown (5YR 3/5, 10YR 7/1, and 5/6) when moist; slightly hard when dry, firm when moist, very plastic and sticky when wet; no apparent clay films, but pores between coarse grains of sand are nearly filled with colloid; strongly acid, pH 5.3; many feet thick.

Tunitas clay loam: 300 yards west of Clear Creek Road and about 5 feet south of the San Gregorio-La Honda Road.

A_{1p} 0 to 8 inches, very dark gray (10YR 3/1) clay loam; black (10YR 2/1) when moist; strong, fine, granular structure; very hard when dry, friable when moist, plastic and sticky when wet; abundant fine roots; high in organic matter; porous; medium acid, pH 6.0; gradual, smooth lower boundary; 4 to 10 inches thick.

B_1 8 to 18 inches, clay of the same color as the A_{1p} horizon; moderate, medium and fine, subangular blocky, breaking to weak, fine, granular structure; extremely hard when dry, firm when moist, sticky and plastic when wet; common fine roots and pores; few thin, discontinuous clay films; gradual, smooth lower boundary; 6 to 14 inches thick.

B_{21} 18 to 26 inches, very dark gray (10YR 3/1) clay; black (10YR 2/1) when moist; moderate, medium, subangular blocky structure; extremely hard when dry, very firm when moist, very plastic and very sticky when wet; few fine roots and pores; common thin, discontinuous clay films; slightly acid, pH 6.5; clear, smooth lower boundary; 4 to 10 inches thick.

B_{22} 26 to 40 inches, very dark gray (10YR 3/1) clay with common, faint, medium mottles of slightly darker color; very dark gray (10YR 3/1) when moist; moderate, medium, subangular blocky structure; extremely hard when dry, very firm when moist, very plastic and very sticky when wet; common thin, discontinuous clay films; mildly alkaline, pH 7.8; clear, smooth lower boundary; 8 to 18 inches thick.

B_3 40 to 46 inches, dark-gray (10YR 4/1) clay, with few, fine, strong-brown mottles, very dark grayish brown (10YR 3/2) when moist; weak, medium and fine, subangular blocky structure; extremely hard when dry, very firm when moist, sticky and plastic when wet; common thin, discontinuous clay films; moderately alkaline, pH 8.0; noncalcareous; contains small amount of gypsum; clear, smooth lower boundary; 2 to 8 inches thick.

C 46 inches +, grayish-brown (10YR 5/2) clay, with distinct medium and coarse mottles of brown; dark grayish brown (10YR 4/2) when moist; massive; very hard when dry, firm when moist, sticky and plastic when wet; few thin, discontinuous clay films; scattered pebbles; occasional pockets of gypsum crystals; moderately alkaline, pH 8.0; noncalcareous.

Watsonville sandy loam: Along Coast Highway, 200 yards north of San Gregorio turnoff.

A_{11} 0 to 12 inches, dark-gray (10YR 4/1) sandy loam; black (10YR 2/1) when moist; strong, medium to very fine, granular structure; slightly hard when dry, friable when moist; high in organic matter; abundant fine roots; porous; few fine, reddish-brown pellets; medium acid, pH 6.0; gradual, smooth lower boundary; 8 to 15 inches thick.

A_{12} (or A_2) 12 to 15 inches, dark-gray (10YR 4/1) fine sandy loam; nearly black (10YR 2/1) when moist; weak, fine, subangular blocky structure; slightly hard when dry, friable when moist; common fine roots and pores; few fine, reddish-brown pellets and mottles; medium acid, pH 6.0; abrupt, smooth lower boundary; 2 to 10 inches thick.

B_{21} 15 to 22 inches, yellowish-brown (10YR 5/4), heavy sandy clay; dark yellowish brown (10YR 4/4) when moist; strong, coarse, columnar structure; very hard when dry, very firm when moist, very plastic and sticky when wet; thin, continuous, dark-gray clay films are present on faces of peds and inside pores, very dark gray when moist; few roots along structural faces; few fine pellets; medium acid, 6.0; gradual lower boundary; 10 to 15 inches thick.

B_{22} 22 to 40 inches, mottled yellowish-brown and grayish-brown (10YR 5/4 and 2.5Y 5/2), heavy sandy clay loam, dark yellowish brown and dark grayish brown (10YR 4/4 and 2.5Y 4/2) when moist; weak, medium, prismatic structure; very hard when dry, firm when moist, slightly plastic and sticky when wet; very few fine roots; common fine, tubular pores; thin, continuous, dark-gray clay films follow tubular pores and spread out on faces of peds; few fine pellets; slightly acid, pH 6.5; diffuse, smooth lower boundary; 10 to 25 inches thick.

B_3 40 to 60 inches, mottled light-gray, light brownish-gray, and yellowish-brown (2.5Y 7/2, 6/2, and 10YR 5/6) sandy clay loam; mottled light olive brown, olive brown, and dark yellowish brown (2.5Y 5/3, 4/4, and 10YR 4/6) when

moist; massive; very hard when dry, firm when moist, slightly plastic and slightly sticky when wet; common fine pores; few very thin, discontinuous clay films with clay mainly in bridges between sand grains; slightly acid, pH 6.5; diffuse, smooth lower boundary, 15 to 25 inches thick.

C_2 60 inches +, faintly mottled, light yellowish-brown and light olive-brown (2.5Y 6/4 and 5/3) sandy loam; brown (10YR 4/3) when moist; massive; very hard when dry; friable when moist; fissures in upper part have some colloidal films; neutral, pH 7.0; many feet thick.

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Appendix I: Summary of Qualities of Each Kind of Soil

Important characteristics and qualities of each soil mapping unit are summarized in table 15. The table gives the name of each soil, the symbol by which it is shown on the map, and the symbol of the capability unit in which it is grouped. References by page number to the description of the soil and to the description and interpretation of the capability unit are given in the Guide to Mapping Units.

Effective depth is the depth of soil readily penetrated by roots. It is the depth to claypan, bedrock, or any other layer in the soil that would stop or greatly hinder the penetration of roots. Limits of the classes are:

Very deep: More than 60 inches.
Deep: 36 to 60 inches.
Moderately deep: 20 to 36 inches.
Shallow: 10 to 20 inches.
Very shallow: Less than 10 inches.

Permeability is the ability of a porous material, such as soil, to transmit fluids. Permeability of soil is expressed by the rate of percolation. Since measurements have not been made on these soils, the ratings given in the table are estimates. The basis for estimating is the rate of percolation, by gravity, through a saturated core of soil about 3 inches in diameter and 3 inches in thickness, that was taken with the least possible disturbance of natural soil structure. The rating of permeability is a general indication of the ease of root penetration. The classes and their percolation rates are:

Very slow: Less than 0.05 inch per hour.
Slow: 0.05 to 0.20 inch per hour.
Moderately slow: 0.20 to 0.80 inch per hour.
Moderate: 0.80 to 2.50 inches per hour.
Moderately rapid: 2.50 to 5.00 inches per hour.
Rapid: 5.00 to 10.00 inches per hour.
Very rapid: More than 10.00 inches per hour.

Classes of the rate of runoff are those defined in the Soil Survey Manual. The classes are ponded, very slow, slow, medium, rapid, and very rapid.

Erosion hazard is an estimate of the risk of erosion if the soil is cultivated or heavily grazed. Ratings, except the one for Coastal beaches, refer to the risk of erosion by water. The classes are none, slight, moderate, high, and very high.

The occurrence of a high water table, one within 5 feet of the surface, has been estimated. Classes are none, occasional, usual, and constant.

Water-holding capacity given in the table is the capacity of the soil, to its effective depth as defined, to hold water available to plants, at its normal field capacity. This is approximately the moisture content of a well-drained soil 2 or 3 days after it has been saturated by rain or by irrigation. Classes and the amounts of water, in inches, held in the soil profile to its effective depth are:

Very low: Less than 3.
Low: 3 to 6.
Good: 6 to 9.
High: 9 to 12.
Very high: More than 12.

The ratings of natural fertility are estimates of the natural ability of the soil to provide the proper nutrients, in the proper amounts and in the right balance, for growth of the usual crops when other factors, such as light, temperature, and physical conditions of the soil, are favorable. Estimates were made in relation to the other soils of this Area. Terms used are very low, low, moderate, and high.

Estimates of workability refer to the amount of work required to till the soil, and the relative difficulty in handling farm machinery. Terms are easy, fairly easy, rather difficult, and difficult.

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TABLE 15.—*Summary of important qualities of the soils*

Name of soil	Symbol on map	Capability unit	Effective depth for roots	Permeability		Rate of runoff	Erosion hazard	Occurrence of high water table	Water-holding capacity	Natural fertility	Workability	Cover or present use
				Surface soil	Subsoil							
Active dune land	Ad	VIIIe–1	Very deep	Very rapid	Very rapid	Very slow	Very high (wind)	None	Very low	Low	Difficult	Few grasses; barren.
Baywood sandy loam, gently sloping, eroded.	BaB2	IIs–4	Very deep	Rapid	Very rapid	Very slow	Slight	None	Low	Low	Easy	Truck crops.
Baywood sandy loam, sloping, eroded	BaC2	IIIe–4	Very deep	Rapid	Very rapid	Very slow to slow	Moderate	None	Low	Low	Easy	Truck crops, pasture.
Baywood sandy loam, moderately steep, eroded.	BaD2	IVe–3	Very deep	Rapid	Very rapid	Slow	High	None	Low	Low	Fairly easy	Truck crops, grain, flax.
Botella clay loam, nearly level	BcA	I–1	Very deep	Moderately slow	Moderately slow	Very slow	None to slight	None	Very high	High	Fairly easy	Truck crops.
Botella clay loam, gently sloping	BcB	IIe–1	Very deep	Moderately slow	Moderately slow	Slow	Slight	None	Very high	High	Fairly easy	Truck crops, grain.
Botella clay loam, sloping, eroded	BcC2	IIIe–1	Very deep	Moderately slow	Moderately slow	Slow to medium	Moderate	None	Very high	High	Rather difficult	Grain, range, flax.
Botella loam, nearly level, imperfectly drained.	BdA	IIw–2	Very deep	Moderate	Moderately slow	Very slow	None	Occasional	High	High	Fairly easy	Truck crops, pasture.
Botella loam, gently sloping, imperfectly drained.	BdB	IIw–2	Very deep	Moderate	Moderately slow	Slow	Slight	Occasional	High	High	Fairly easy	Grain, flax, range.
Botella loam, gently sloping	BeB	IIe–1	Very deep	Moderate	Moderately slow	Slow	Slight	None	High	High	Easy	Truck crops, pasture.
Botella loam, sloping, eroded	BeC2	IIIe–1	Very deep	Moderate	Moderately slow	Slow to medium	Moderate	None	High	High	Fairly easy	Grain, range, flax.
Botella loam, nearly level and gently sloping, poorly drained variant.	BfB	IIIw–2	Very deep	Moderate	Moderately slow	Slow	None to slight	General	High	High	Rather difficult	Range.
Botella loam, sloping, seeped	BoC	IIIe–1	Very deep	Moderate	Moderately slow	Slow to medium	Moderate	Occasional	High	High	Rather difficult	Grain, range, flax.
Butano shaly loam, very steep	BsF	VIIe–6	Moderately deep to deep.	Moderate	Moderate	Very rapid	Moderate to high	None	Low to good	Moderate	Difficult	Forestry, watershed.
Butano loam, moderately steep	BuD	IVe–6	Deep	Moderate	Moderate	Medium	Slight to moderate	None	Good	Moderate	Rather difficult	Forestry.
Butano loam, steep	BuE	VIe–6	Deep	Moderate	Moderate	Medium to rapid	Moderate to high	None	Good	Moderate	Difficult	Forestry.
Butano loam, very steep	BuF	VIIe–6	Moderately deep to deep.	Moderate	Moderate	Very rapid	High	None	Low to good	Moderate	Difficult	Forestry.
Cayucos clay, moderately steep, eroded	CaD2	IVe–5	Moderately deep	Slow	Slow	Medium	Moderate	None	Good	Moderate	Difficult	Range.
Cayucos clay loam, sloping, eroded	CcC2	IIIe–1	Moderately deep	Slow	Slow	Medium	Moderate	None	Good	Moderate	Rather difficult	Grain, range, flax.
Cayucos clay loam, moderately steep, eroded.	CcD2	IVe–5	Moderately deep	Slow	Slow	Medium	Moderate	None	Good	Moderate	Rather difficult	Grain, range, flax.
Cayucos clay loam, steep, eroded	CcE2	VIe–5	Shallow to moderately deep.	Slow	Slow	Medium to rapid	Moderate to high	None	Low	Moderate	Difficult	Range.
Cayucos clay loam, very steep, eroded	CcF2	VIIe–5	Shallow to moderately deep.	Slow	Slow	Medium to rapid	Moderate to high	None	Low	Moderate	Difficult	Range.
Cayucos clay loam, steep and very steep, severely eroded.	CcF3	VIIe–5	Shallow	Slow	Slow	Rapid to very rapid.	High to very high	None	Very low	Low	Difficult	Range.
Cayucos clay loam, deep, sloping, eroded	CdC2	IIIe–1	Deep	Slow	Slow	Medium	Moderate	None	High	Moderate	Fairly easy	Grain, range.
Cayucos clay loam, deep, moderately steep, eroded.	CdD2	IVe–5	Deep	Slow	Slow	Medium	Moderate	None	High	Moderate	Rather difficult	Grain, range, flax.
Cayucos stony clay loam, very steep, eroded.	CeF2	VIIe–5	Shallow to moderately deep.	Slow	Slow	Rapid	High	None	Low	Moderate	Difficult	Range.
Coastal beaches	Cf	VIIIe–1	Variable	Very rapid	Very rapid	Very slow	Wave action	Affected by tides.	Very low	Low	Difficult	Barren.
Colma loam, sloping, eroded	ClC2	IIIe–3	Moderately deep to deep.	Moderate	Moderate	Slow to medium	Slight to moderate	None	Good	Low	Fairly easy	Grain, flax.
Colma loam, moderately steep, eroded	ClD2	IVe–3	Shallow to moderately deep.	Moderate	Moderate	Medium	Moderate	None	Low to good	Low	Fairly easy	Grain, range, flax.
Colma loam, steep, eroded	ClE2	VIe–3	Shallow to moderately deep.	Moderate	Moderate	Rapid	High	None	Low to good	Low	Rather difficult	Range, grain, flax.
Colma loam, very steep, eroded	ClF2	VIIe–3	Shallow to moderately deep.	Moderate	Moderate	Very rapid	Very high	None	Very low to low.	Low	Difficult	Range.
Colma sandy loam, sloping, eroded	CmC2	IIIe–3	Moderately deep	Rapid	Moderate	Slow to medium	Slight to moderate	None	Low	Low	Easy	Grain, range, flax.
Colma sandy loam, moderately steep, eroded.	CmD2	IVe–3	Shallow to moderately deep.	Rapid	Moderate	Medium	Moderate	None	Low	Low	Fairly easy	Grain, range, flax.
Colma sandy loam, steep, eroded	CmE2	VIe–3	Shallow to moderately deep.	Rapid	Moderate	Rapid	High	None	Low	Low	Rather difficult	Range.
Colma sandy loam, very steep, eroded	CmF2	VIIe–3	Shallow	Rapid	Moderate	Very rapid	Very high	None	Very low	Low	Difficult	Range, watershed.
Colma sandy loam, steep and very steep, severely eroded.	CmF3	VIIe–3	Very shallow to shallow.	Rapid	Moderate	Very rapid	Very high	None	Very low	Low	Difficult	Range, watershed.
Coquille loam, nearly level, saline	CoA	IIIw–2	Shallow	Moderate	Moderately slow	Ponded to very slow.	None	Constant	High	Moderate	Difficult	Range, some truck.
Corralitos loamy sand, nearly level, imperfectly drained.	CrA	IIs–4	Very deep	Very rapid	Very rapid	Very slow	None to slight	Occasional	Low	Low	Fairly easy	Truck.
Corralitos sandy loam, nearly level	CsA	IIs–4	Very deep	Rapid	Very rapid	Very slow	None to slight	None	Low	Low	Easy	Truck.
Corralitos sandy loam, gently sloping	CsB	IIs–4	Very deep	Rapid	Very rapid	Very slow to slow	Slight	None	Low	Low	Easy	Truck, pasture.
Corralitos sandy loam, nearly level, imperfectly drained.	CtA	IIw–2	Very deep	Rapid	Very rapid	Very slow	None to slight	Occasional	Low	Low	Easy	Truck, pasture.
Corralitos sandy loam, gently sloping, imperfectly drained.	CtB	IIw–2	Very deep	Rapid	Very rapid	Very slow	Slight	Occasional	Low	Low	Easy	Truck, pasture.
Corralitos sandy loam, over gravel, nearly level, imperfectly drained.	CuA	IIs–4	Moderately deep	Rapid	Very rapid	Very slow	None to slight	Occasional	Low	Low	Easy	Truck, pasture.
Corralitos sandy loam, over gravel, gently sloping.	CwB	IIs–4	Moderately deep	Rapid	Very rapid	Very slow to slow	Slight	None	Low	Low	Easy	Truck, pasture.

TABLE 15.—*Summary of important qualities of the soils*—Continued

Name of soil	Symbol on map	Capability unit	Effective depth for roots	Permeability		Rate of runoff	Erosion hazard	Occurrence of high water table	Water-holding capacity	Natural fertility	Workability	Cover or present use
				Surface soil	Subsoil							
Corralitos sandy loam, over clay, nearly level, imperfectly drained.	CyA	IIw–2	Shallow to moderately deep.	Rapid	Slow	Very slow	None to slight	General	Very good	Moderate	Fairly easy	Truck, pasture.
Denison clay loam, nearly level	DcA	IIs–3	Deep	Moderately slow	Slow	Very slow	None to slight	None	Very high	High	Rather difficult	Truck.
Denison clay loam, nearly level, imperfectly drained.	DdA	IIw–2	Deep	Moderately slow	Slow	Very slow	None to slight	Occasional	Very high	High	Rather difficult	Truck.
Denison coarse sandy loam, nearly level	DeA	IIs–3	Deep	Moderately rapid	Moderately slow	Very slow	None to slight	None	High	High	Easy	Truck, flowers.
Denison loam, nearly level	DmA	IIs–3	Deep	Moderate	Moderately slow to slow.	Very slow to slow	None to slight	None	High	High	Easy	Truck, flowers.
Denison loam, gently sloping	DmB	IIe–1	Deep	Moderate	Moderately slow to slow.	Very slow	Slight	None	High	High	Easy	Truck, flowers.
Denison loam, sloping	DmC	IIIe–1	Deep	Moderate	Moderately slow to slow.	Slow to medium	Slight to moderate	None	High	High	Fairly easy	Truck.
Dublin clay, nearly level	DuA	IIw–2	Deep	Slow	Slow	Very slow	None to slight	None	Very high	High	Rather difficult	Truck, pasture.
Dublin clay, gently sloping	DuB	IIe–1	Deep	Slow	Slow	Slow	Slight	None	Very high	High	Rather difficult	Truck, pasture, grain, flax.
Dublin clay, sloping, eroded	DuC2	IIIe–1	Deep	Slow	Slow	Slow	Slight	None	Very high	High	Difficult	Truck, pasture, grain, flax.
Dublin clay, moderately steep, eroded	DuD2	IVe–5	Deep	Slow	Slow	Medium	Moderate	None	Very high	High	Difficult	Grain, flax.
Dublin clay, nearly level, imperfectly drained.	DwA	IIw–2	Deep	Slow	Slow	Very slow	None	General	Very high	High	Difficult	Truck, pasture, grain.
Dublin clay, gently sloping, imperfectly drained.	DwB	IIw–2	Deep	Slow	Slow	Very slow	Slight	General	Very high	High	Difficult	Truck, pasture, range.
Elkhorn sandy loam, gently sloping	EhB	IIIs–3	Deep	Moderately rapid	Moderately slow	Slow	Slight	None	Good	Moderate	Easy	Truck, grain, flax.
Elkhorn sandy loam, gently sloping, eroded.	EhB2	IIIs–3	Deep	Moderately rapid	Moderately slow	Slow	Slight	None	Good	Moderate	Easy	Truck, grain, flax.
Elkhorn sandy loam, sloping, eroded	EhC2	IIIe–3	Deep	Moderately rapid	Moderately slow	Slow	Slight	None	Good	Moderate	Fairly easy	Truck, grain, flax.
Elkhorn sandy loam, moderately steep, eroded.	EhD2	IVe–3	Deep	Moderately rapid	Moderately slow	Medium	Moderate	None	Good	Moderate	Rather difficult	Grain, flax.
Elkhorn sandy loam, moderately steep and steep, severely eroded.	EhE3	VIe–3	Deep	Moderate	Moderately slow	Medium to very rapid.	Moderate to very high.	None	Good	Moderate	Difficult	Range, grain, flax.
Elkhorn sandy loam, thick surface, gently sloping.	EtB	IIs–3	Deep	Moderately rapid	Moderately slow	Slow	Slight	None	Good	Moderate	Easy	Truck, grain.
Elkhorn sandy loam, thick surface, sloping, eroded.	EtC2	IIIe–1	Deep	Moderately rapid	Moderately slow	Slow	Slight	None	Good	Moderate	Fairly easy	Truck, grain, flax.
Farallone loam, nearly level	FaA	I–1	Very deep	Moderate	Moderately rapid to rapid.	Very slow	None to slight	None	Good	Moderate	Easy	Truck, flowers.
Farallone loam, gently sloping	FaB	IIe–1	Very deep	Moderate	Moderately rapid to rapid.	Slow	Slight	None	Good	Moderate	Easy	Truck, flowers.
Farallone coarse sandy loam, nearly level.	FcA	IIs–4	Very deep	Rapid	Rapid	Very slow	None to slight	None	Low	Low	Easy	Truck, flowers.
Farallone coarse sandy loam, gently sloping.	FcB	IIs–4	Very deep	Rapid	Rapid	Slow	Slight	None	Low	Low	Easy	Truck, flowers.
Farallone coarse sandy loam, sloping, eroded.	FcC2	IIIe–4	Very deep	Rapid	Rapid	Slow	Slight	None	Low	Low	Fairly easy	Truck, flowers.
Farallone coarse sandy loam, moderately steep, eroded.	FcD2	IVe–1	Very deep	Rapid	Rapid	Slow to medium	Moderate	None	Low	Low	Fairly easy	Truck, flowers.
Farallone coarse sandy loam, over coarse sands, gently sloping, seeped.	FsB	IIw–2	Very deep	Rapid	Very rapid	Slow	Slight	General	Low	Low	Easy	Truck, flowers.
Farallone loamy coarse sand, gently sloping.	FyB	IIs–4	Very deep	Very rapid	Very rapid	Very slow	Slight	None	Low	Low	Easy	Truck, flowers.
Farallone loamy coarse sand, sloping, eroded.	FyC2	IIIe–4	Very deep	Very rapid	Very rapid	Slow	Slight	None	Low	Low	Easy	Truck, flowers.
Gazos fine sandy loam, moderately steep, eroded.	GaD2	IVe–1	Moderately deep	Moderately rapid	Moderate	Medium	Moderate	None	Low	Moderate	Rather difficult	Grain, flax, hay.
Gazos fine sandy loam, steep, eroded	GaE2	VIe–1	Shallow to moderately deep.	Moderately rapid	Moderate	Rapid	High	None	Very low to low.	Moderate	Difficult	Range, grain, flax.
Gazos loam, sloping, eroded	GbC2	IIIe–1	Shallow to moderately deep.	Moderate	Moderate	Slow	Slight	None	Very low	Moderate	Rather difficult	Grain, flax, range.
Gazos loam, moderately steep, eroded	GbD2	IVe–1	Shallow to moderately deep.	Moderate	Moderate	Medium	Moderate	None	Very low to low.	Moderate	Difficult	Grain, flax, range.
Gazos loam, moderately steep, severely eroded.	GbD3	VIe–1	Shallow	Moderate	Moderate	Medium	High	None	Very low to low.	Low	Difficult	Range.
Gazos loam, steep, eroded	GbE2	VIe–1	Shallow to moderately deep.	Moderate	Moderate	Rapid	High	None	Very low to low.	Moderate	Difficult	Range.
Gazos loam, very steep, eroded	GbF2	VIIe–1	Shallow to moderately deep.	Moderate	Moderate	Very rapid	Very high	None	Very low to low.	Low to moderate.	Difficult	Range.
Gazos (dark phase)-Calera loams, sloping, eroded.	GcC2	IIIe–1	Shallow to moderately deep.	Moderate	Moderate	Slow	Slight	None	Low	Moderate	Rather difficult	Range, grain.
Gazos (dark phase)-Calera loams, steep, eroded.	GcE2	VIe–1	Shallow to moderately deep.	Moderate	Moderate	Rapid	High	None	Very low to low.	Moderate	Difficult	Range.

TABLE 15.—*Summary of important qualities of the soils*—Continued

Name of soil	Symbol on map	Capability unit	Effective depth for roots	Permeability		Rate of runoff	Erosion hazard	Occurrence of high water table	Water-holding capacity	Natural fertility	Workability	Cover or present use
				Surface soil	Subsoil							
Gazos (dark phase)-Calera loams, very steep, eroded.	GcF2	VIIe–1	Shallow to moderately deep.	Moderate	Moderate	Very rapid	Very high	None	Very low	Low to moderate.	Difficult	Range.
Gazos loam, dark, sloping, eroded	GdC2	IIIe–1	Shallow to moderately deep.	Moderate	Moderate	Slow	Slight	None	Low	Moderate	Rather difficult	Grain, flax, range.
Gazos (dark phase)-Sweeney loams, steep, eroded.	GkE2	VIe–1	Shallow to deep	Moderate	Moderate and moderately slow.	Rapid	High	None	Very low to high.	Low to high	Difficult	Range.
Gazos-Lobitos silt loams, gently sloping	GlB	IIIe–1	Moderately deep	Moderate	Moderate and moderately slow.	Slow	Slight	None	Low	Moderate	Easy	Grain, range.
Gazos-Lobitos silt loams, sloping, eroded	GlC2	IIIe–1	Shallow to moderately deep.	Moderate	Moderate and moderately slow.	Slow to medium	Slight to moderate	None	Low	Moderate	Rather difficult	Grain, range.
Gazos-Lobitos silt loams, moderately steep, eroded.	GlD2	IVe–1	Shallow to moderately deep.	Moderate	Moderate and moderately slow.	Medium	Moderate	None	Low	Moderate	Difficult	Grain, range.
Gazos-Lobitos silt loams, steep, eroded	GlE2	VIe–1	Shallow to moderately deep.	Moderate	Moderate and moderately slow.	Rapid	High	None	Low	Moderate	Difficult	Range.
Gazos-Lobitos silt loams, very steep	GlF	VIIe–1	Shallow to moderately deep.	Moderate	Moderate and moderately slow.	Very rapid	Very high	None	Low	Moderate	Difficult	Range.
Gazos and Lobitos soils, steep and very steep, severely eroded.	GoF3	VIIe–1	Very shallow to shallow.	Moderate	Moderate and moderately slow.	Very rapid	Very high	None	Very low	Moderate	Difficult	Range.
Gazos and Lobitos stony loams, steep, eroded.	GsE2	VIe–1	Shallow	Moderate	Moderate and moderately slow.	Rapid	High	None	Very low	Moderate	Difficult	Range.
Gazos and Lobitos stony loams, very steep, eroded.	GsF2	VIIe–1	Shallow	Moderate	Moderate and moderately slow.	Very rapid	Very high	None	Very low	Moderate	Difficult	Range.
Gullied land (alluvial soil material)	Gu	VIIIe–1					Very high	None				Brush, willow.
Gullied land (Gazos-Lobitos soil material).	Gv	VIIIe–1					Very high	None				Brush, willow.
Gullied land (Tierra and Watsonville soil materials).	Gw	VIIIe–1					Very high	None				Grasses, brush.
Hugo and Josephine loams, sloping	HuC	IIIe–1	Deep	Moderate	Moderate (Hugo) moderately slow (Josephine).	Slow	Slight	None	Good	Low to moderate.	Fairly easy	Timber, some range.
Hugo and Josephine loams, moderately steep.	HuD	IVe–6	Moderately deep to deep.	Moderate	Moderate (Hugo) moderately slow (Josephine).	Medium	Moderate	None	Low to good	Low to moderate.	Rather difficult	Timber, some range.
Hugo and Josephine loams, moderately steep, eroded.	HuD2	IVe–6	Moderately deep to deep.	Moderate	Moderate (Hugo) moderately slow (Josephine).	Medium	Moderate	None	Low to good	Low to moderate.	Rather difficult	Timber, some range.
Hugo and Josephine loams, steep	HuE	VIe–6	Deep	Moderate	Moderate (Hugo) moderately slow (Josephine).	Rapid	High	None	Low to good	Low to moderate.	Difficult	Timber.
Hugo and Josephine loams, steep, eroded	HuE2	VIe–6	Moderately deep to deep.	Moderate	Moderate (Hugo) moderately slow (Josephine).	Rapid	High	None	Low to good	Low to moderate.	Difficult	Timber.
Hugo and Josephine loams, very steep	HuF	VIIe–6	Deep	Moderate	Moderate (Hugo) moderately slow (Josephine).	Very rapid	Very high	None	Low to good	Low to moderate.	Difficult	Timber.
Hugo and Josephine loams, very deep, gently sloping.	HvB	IIe–1	Very deep	Moderate	Moderate (Hugo) moderately slow (Josephine).	Very slow to slow	Slight	None	Good to high	Moderate	Easy	Timber.
Hugo and Josephine loams, very deep, sloping.	HvC	IIIe–1	Very deep	Moderate	Moderate (Hugo) moderately slow (Josephine).	Slow	Slight	None	Good to high	Moderate	Fairly easy	Timber.
Hugo and Josephine sandy loams, sloping, eroded	HyC2	IIIe–1	Moderately deep to deep.	Moderately rapid	Moderately rapid (Hugo) moderately slow (Josephine).	Slow	Slight to moderate	None	Low to good	Low to moderate.	Fairly easy	Timber, some range.
Hugo and Josephine sandy loams, moderately steep, eroded.	HyD2	IVe–6	Moderately deep to deep.	Moderately rapid	Moderately rapid (Hugo) moderately slow (Josephine).	Medium	Moderate	None	Low to good	Low to moderate.	Rather difficult	Timber, some range.
Hugo and Josephine sandy loams, steep	HyE	VIe–6	Deep	Moderately rapid	Moderately rapid (Hugo) moderately slow (Josephine).	Rapid	High	None	Low to good	Low to moderate.	Difficult	Timber.
Hugo and Josephine sandy loams, steep, eroded.	HyE2	VIe–6	Moderately deep to deep.	Moderately rapid	Moderately rapid (Hugo) moderately slow (Josephine).	Rapid	High	None	Low to good	Low to moderate.	Difficult	Timber.
Hugo and Josephine sandy loams, very steep.	HyF	VIIe—6	Deep	Moderately rapid	Moderately rapid (Hugo) moderately slow (Josephine).	Very rapid	Very high	None	Low to good	Low to moderate.	Difficult	Timber.
Hugo and Josephine sandy loams, very steep, eroded.	HyF2	VIIe–6	Moderately deep to deep.	Moderately rapid	Moderately rapid (Hugo) moderately slow (Josephine).	Very rapid	Very high	None	Low to good	Low to moderate.	Difficult	Timber.
Hugo and Josephine sandy loams, very deep, sloping.	HzC	IIIe–1	Very deep	Moderately rapid	Moderately rapid (Hugo) moderately slow (Josephine).	Slow	Slight	None	Good	Low to moderate.	Fairly easy	Timber.

TABLE 15.—*Summary of important qualities of the soils*—Continued

Name of soil	Symbol on map	Capability unit	Effective depth for roots	Permeability		Rate of runoff	Erosion hazard	Occurrence of high water table	Water-holding capacity	Natural fertility	Workability	Cover or present use
				Surface soil	Subsoil							
Hugo and Josephine sandy loams, very deep, moderately steep.	HzD	IVe–6	Very deep	Moderately rapid	Moderately rapid (Hugo) moderately slow (Josephine).	Medium	Moderate	None	Good	Low to moderate.	Rather difficult	Timber.
Laughlin loam, sloping, eroded	LaC2	IIIe–1	Shallow to moderately deep.	Moderate	Moderate	Slow to medium	Slight to moderate	None	Low	Moderate	Rather difficult	Range, grain.
Laughlin loam, moderately steep, eroded	LaD2	IVe–1	Shallow to moderately deep.	Moderate	Moderate	Medium	Moderate	None	Low	Moderate	Difficult	Range, grain.
Laughlin loam, steep, eroded	LaE2	VIe–1	Shallow to moderately deep.	Moderate	Moderate	Rapid	High	None	Low	Moderate	Difficult	Range, some timber.
Laughlin loam, very steep, eroded	LaF2	VIIe–1	Shallow to moderately deep.	Moderate	Moderate	Very rapid	Very high	None	Low	Moderate	Difficult	Range, watershed, some timber.
Laughlin-Sweeney loams, sloping, eroded	LbC2	IIIe–1	Moderately deep to deep.	Moderate	Moderate and moderately slow.	Slow to medium	Slight to moderate	None	Low to high	Moderate to high.	Rather difficult	Grain, range.
Laughlin-Sweeney loams, moderately steep, eroded.	LbD2	IVe–1	Shallow to deep	Moderate	Moderate and moderately slow.	Medium	Moderate	None	Low to high	Moderate to high.	Difficult	Grain, range.
Laughlin-Sweeney loams, steep, eroded	LbE2	VIe–1	Shallow to deep	Moderate	Moderate and moderately slow.	Rapid	High	None	Low to high	Moderate to high.	Difficult	Range.
Laughlin-Sweeney loams, very steep, eroded.	LbF2	VIIe–1	Shallow	Moderate	Moderate and moderately slow.	Very rapid	Very high	None	Low to high	Moderate to high.	Difficult	Range.
Lobitos loam, deep, sloping, eroded	LdC2	IIIe–1	Deep	Moderate	Moderately slow	Slow to medium	Slight	None	Good	Moderate	Rather difficult	Grain, flax, range.
Lobitos loam, deep, moderately steep, eroded.	LdD2	IVe–1	Deep	Moderate	Moderately slow	Medium	Moderate	None	Good	Moderate	Difficult	Grain, flax, range.
Lobitos fine sandy loam, sloping, eroded	LfC2	IIIe–1	Moderately deep	Moderately rapid	Moderately slow	Slow to medium	Slight	None	Low	Moderate	Rather difficult	Grain, flax, range.
Lobitos fine sandy loam, moderately steep, eroded.	LfD2	IVe–1	Moderately deep	Moderately rapid	Moderately slow	Medium	Moderate	None	Low	Moderate	Difficult	Grain, flax, range.
Lobitos fine sandy loam, steep, eroded	LfE2	VIe–1	Moderately deep	Moderately rapid	Moderately slow	Rapid	High	None	Low	Moderate	Difficult	Range.
Lobitos loam, sloping, eroded	LlC2	IIIe–1	Moderately deep	Moderate	Moderately slow	Slow to medium	Slight	None	Low	Moderate	Rather difficult	Grain, flax, range.
Lobitos loam, moderately steep, eroded	LlD2	IVe–1	Moderately deep	Moderate	Moderately slow	Medium	Moderate	None	Low	Moderate	Difficult	Grain, flax, range.
Lobitos loam, steep, eroded	LlE2	VIe–1	Moderately deep	Moderate	Moderately slow	Rapid	High	None	Low	Moderate	Difficult	Range.
Lobitos loam, very steep, eroded	LlF2	VIIe–1	Moderately deep	Moderate	Moderately slow	Very rapid	Very high	None	Low	Moderate	Difficult	Range, watershed.
Lockwood loam, gently sloping	LmB	IIe–1	Very deep	Moderate	Moderately slow	Slow	Slight	None	High	Moderate	Easy	Truck, grain, flax.
Lockwood loam, sloping, eroded	LmC2	IIIe–1	Very deep	Moderate	Moderately slow	Slow to medium	Slight to moderate	None	High	Moderate	Fairly easy	Pasture, truck.
Lockwood loam, nearly level, imperfectly drained.	LoA	IIw–2	Very deep	Moderate	Moderately slow to slow.	Very slow	None to slight	General	High	Moderate	Fairly easy	Pasture, truck.
Lockwood shaly loam, gently sloping	LsB	IIe–1	Very deep	Moderate	Moderately slow	Slow	Slight	None	High to good	Moderate	Easy	Truck, pasture, grain, flax.
Lockwood loam, brown subsoil variant, gently sloping, eroded.	LvB2	IIIs–3	Deep	Moderate	Slow	Slow	Slight	None	Good	Moderate	Easy	Grain, flax.
Lockwood loam, brown subsoil variant, sloping, eroded.	LvC2	IIIe–3	Deep	Moderate	Slow	Slow to medium	Slight to moderate	None	Good	Moderate	Fairly easy	Grain, flax.
Lockwood loam, brown subsoil variant, moderately steep, eroded.	LvD2	IVe–3	Deep	Moderate	Slow	Medium	Moderate	None	Good	Moderate	Rather difficult	Flax.
Lockwood loam, gently sloping, seeped	LwB	IIw–2	Very deep	Moderate	Moderately slow	Slow	Slight	General	High	Moderate	Easy	Pasture, truck.
Lockwood loam, sloping, seeped	LwC	IIIe–1	Very deep	Moderate	Moderately slow	Slow to medium	Slight to moderate	General	High	Moderate	Fairly easy	Pasture, truck.
Los Gatos clay loam, sloping, eroded	LyC2	IIIe–1	Moderately deep to deep.	Moderately slow	Moderately slow	Slow to medium	Slight to moderate	None	Good	Moderate	Rather difficult	Watershed.
Los Gatos clay loam, steep, eroded	LyE2	VIe–1	Moderately deep	Moderately slow	Moderately slow	Rapid	High	None	Low	Moderate	Difficult	Watershed.
Los Gatos loam, very steep	LzF	VIIe–1	Moderately deep	Moderate	Moderately slow	Very rapid	Very high	None	Low	Moderate	Difficult	Watershed.
Mixed alluvial land	Ma	VIIIe–1						Occasional	Variable	Low	Difficult	Willow, brush.
Mindego clay loam, steep	MdE	VIe–6	Moderately deep to deep.	Moderately slow	Slow	Rapid	High	None	Good to high	High	Difficult	Timber.
Mindego clay loam, very steep	MdF	VIIe–6	Moderately deep to deep.	Moderately slow	Slow	Very rapid	Very high	None	Good to high	High	Difficult	Timber.
Mindego stony clay loam, very steep	MgF	VIIe–6	Moderately deep to deep.	Moderately slow	Slow	Very rapid	Very high	None	Good to high	High	Difficult	Timber.
Miramar coarse sandy loam, sloping, eroded.	MmC2	IIIe–1	Moderately deep to deep.	Rapid	Moderately slow	Slow to medium	Slight to moderate	None	Low	Low	Fairly easy	Pasture, grain.
Miramar coarse sandy loam, moderately steep, eroded.	MmD2	IVe–1	Moderately deep to deep.	Rapid	Moderately slow	Medium	Moderate	None	Low	Low	Rather difficult	Grain, range.
Miramar coarse sandy loam, steep, eroded.	MmE2	VIe–4	Moderately deep to deep.	Rapid	Moderately slow	Rapid	High	None	Low	Low	Difficult	Range, watershed.
Miramar coarse sandy loam, steep, severely eroded.	MmE3	VIIe–4	Moderately deep	Rapid	Moderately slow	Rapid		None	Low	Low	Difficult	Range, watershed.
Miramar coarse sandy loam, very steep, eroded.	MmF2	VIIe–4	Moderately deep	Rapid	Moderately slow	Very rapid	Very high	None	Low	Low	Difficult	Watershed.
Montara stony loam, steep and very steep, eroded.	MoF2	VIIe–1	Shallow	Moderate	Moderately slow	Rapid to very rapid.	High to very high	None	Very low	Low	Difficult	Watershed.
Pomponio clay loam, sloping, eroded	PoC2	IIIe–3	Shallow to moderately deep.	Moderately slow	Very slow	Slow to medium	Slight to moderate	None	Low	Low	Rather difficult	Grain, flax, range.
Pomponio clay loam, moderately steep, eroded.	PoD2	IVe–3	Shallow to moderately deep.	Moderately slow	Very slow	Medium	High	None	Low	Low	Difficult	Grain, flax, range.

TABLE 15.—*Summary of important qualities of the soils*—Continued

Name of soil	Symbol on map	Capability unit	Effective depth for roots	Permeability		Rate of runoff	Erosion hazard	Occurrence of high water table	Water-holding capacity	Natural fertility	Workability	Cover or present use
				Surface soil	Subsoil							
Pomponio loam, sloping, eroded	PpC2	IIIe–3	Shallow to moderately deep.	Moderate	Very slow	Slow to medium	Slight to moderate	None	Low	Low	Rather difficult	Grain, flax, range.
Pomponio loam, moderately steep, eroded.	PpD2	IVe–3	Shallow to moderately deep.	Moderate	Very slow	Medium	High	None	Low	Low	Difficult	Range, grain, flax.
Pomponio loam, steep, eroded	PpE2	VIe–3	Shallow	Moderate	Very slow	Rapid	Very high	None	Low	Low	Difficult	Range.
Rough broken land	Rb	VIIIe–1	Very shallow	Variable	Variable	Very rapid	Very high	None	Very low	Low	Difficult	Watershed.
Santa Lucia loam, sloping, eroded	SaC2	IIIe–1	Moderately deep to deep.	Moderate	Moderate	Slow to medium	Slight to moderate	None	Low to good	Low	Rather difficult	Range, grain, flax.
Santa Lucia loam, moderately steep, eroded.	SaD2	IVe–1	Shallow to moderately deep.	Moderate	Moderate	Medium	Moderate	None	Low	Low	Rather difficult	Range, grain, flax.
Santa Lucia loam, steep, eroded	SaE2	VIe–1	Shallow to moderately deep.	Moderate	Moderate	Rapid	High	None	Low	Low	Difficult	Range.
Santa Lucia loam, very steep, eroded	SaF2	VIIe–1	Shallow to moderately deep.	Moderate	Moderate	Very rapid	Very high	None	Low	Low	Difficult	Range.
Santa Lucia loam, steep and very steep, severely eroded.	SaF3	VIIe–1	Very shallow to shallow.	Moderate	Moderate	Rapid to very rapid.	Very high	None	Very low to low.	Low	Difficult	Range, watershed.
Santa Lucia stony loam, steep, eroded	SbE2	VIe–1	Shallow to moderately deep.	Moderate	Moderate	Rapid	High	None	Low	Low	Difficult	Range, watershed.
Santa Lucia stony loam, very steep, eroded.	SbF2	VIIe–1	Shallow to moderately deep.	Moderate	Moderate	Very rapid	Very high	None	Low	Low	Difficult	Watershed.
Santa Lucia stony loam, steep and very steep, severely eroded.	SbF3	VIIe–1	Very shallow to shallow.	Moderate	Moderate	Rapid to very rapid.	Very high	None	Very low to low.	Low	Difficult	Watershed.
Santa Lucia stony loam, very shallow, steep and very steep, severely eroded.	ScF3	VIIe–1	Very shallow	Moderate	Moderate	Very rapid	Very high	None	Very low	Low	Difficult	Watershed.
Stabilized dune land	Sd	VIIIe–1	Very deep	Very rapid	Very rapid	Very slow	Very high (wind)	None	Low	Low	Difficult	Some grass.
Sheridan coarse sandy loam, moderately steep.	ShD	IVe–6	Deep	Rapid	Rapid	Slow to medium	Slight to moderate	None	Low	Low	Rather difficult	Watershed, timber.
Sheridan coarse sandy loam, steep	ShE	VIe–6	Deep	Rapid	Rapid	Medium	Moderate	None	Low	Low	Difficult	Watershed, timber.
Sheridan coarse sandy loam, very steep	ShF	VIIe–6	Deep	Rapid	Rapid	Rapid	High	None	Low	Low	Difficult	Watershed, timber.
Soquel loam, nearly level	SkA	I–1	Very deep	Moderate	Moderate	Very slow	None to slight	None	High	High	Easy	Truck, flowers, pasture.
Soquel loam, gently sloping	SkB	IIe–1	Very deep	Moderate	Moderate	Very slow to slow	Slight	None	High	High	Easy	Truck, flowers, pasture.
Soquel loam, sloping, eroded	SkC2	IIIe–1	Very deep	Moderate	Moderate	Slow to medium	Slight to moderate	None	High	High	Easy	Truck, flowers, pasture.
Soquel loam, nearly level, imperfectly drained.	SmA	IIw–2	Very deep	Moderate	Moderate	Very slow	None to slight	Occasional	High	High	Easy	Truck, flowers, pasture.
Soquel loam, over clay, nearly level	SoA	I–1	Deep	Moderate	Moderately slow	Very slow	None to slight	None	High	High	Easy	Truck, flowers, pasture.
Soquel loam, gently sloping, poorly drained.	SpB	IIIw–2	Deep	Moderate	Moderate	Slow	Slight	General	High	High	Easy	Truck, pasture.
Soquel loam, over clay, nearly level, poorly drained.	SrA	IIIw–2	Deep	Moderate	Moderately slow	Very slow	None to slight	General	High	High	Easy	Truck, pasture.
Soquel loam, over clay, nearly level, imperfectly drained.	SsA	IIw–2	Deep	Moderate	Moderately slow	Very slow	None to slight	Occasional	High	High	Easy	Truck.
Sweeney clay, sloping	StC	IIIe–1	Moderately deep to deep.	Slow	Slow	Slow to medium	Slight	None	High	Moderate	Difficult	Grain, range.
Sweeney clay, moderately steep, eroded	StD2	IVe–5	Moderately deep to deep.	Slow	Slow	Medium	Moderate	None	High	Moderate	Difficult	Grain, range.
Sweeney clay loam, sloping, eroded	SwC2	IIIe–1	Deep	Moderately slow	Moderately slow	Slow to medium	Slight to moderate	None	High	High	Rather difficult	Grain, range.
Sweeney clay loam, moderately steep, eroded.	SwD2	IVe–5	Deep	Moderately slow	Moderately slow	Medium	Moderate	None	High	High	Difficult	Grain, range.
Sweeney clay loam, steep, eroded	SwE2	VIe–5	Deep	Moderately slow	Moderately slow	Rapid	High	None	High	High	Difficult	Range.
Sweeney clay loam, very steep, eroded	SwF2	VIIe–5	Deep	Moderately slow	Moderately slow	Very rapid	Very high	None	High	High	Difficult	Range.
Sweeney clay loam, steep and very steep, severely eroded.	SwF3	VIIe–5	Deep	Moderately slow	Moderately slow	Very rapid	Very high	None	High	High	Difficult	Range.
Sweeney clay loam, deep, sloping, eroded.	SxC2	IIIe–1	Deep to very deep	Moderately slow	Moderately slow	Slow to medium	Slight to moderate	None	Very high	High	Rather difficult	Grain, range.
Sweeney clay loam, deep, moderately steep, eroded.	SxD2	IVe–5	Deep to very deep	Moderately slow	Moderately slow	Medium	Moderate	None	Very high	High	Difficult	Grain, range.
Sweeney loam, sloping, eroded	SyC2	IIIe–1	Deep	Moderate	Moderately slow	Slow to medium	Slight to moderate	None	High	High	Rather difficult	Grain, range.
Sweeney loam, moderately steep, eroded	SyD2	IVe–5	Deep	Moderate	Moderately slow	Medium	Moderate	None	High	High	Difficult	Grain, range.
Sweeney loam, steep, eroded	SyE2	VIe–5	Deep	Moderate	Moderately slow	Rapid	High	None	High	High	Difficult	Range.
Sweeney loam, very steep, eroded	SyF2	VIIe–5	Deep	Moderate	Moderately slow	Very rapid	Very high	None	High	High	Difficult	Range.
Sweeney stony clay loam, moderately steep, eroded.	SzD2	IVe–5	Deep	Moderately slow	Moderately slow	Medium	Moderate	None	Good	Moderate	Difficult	Range.
Sweeney stony clay loam, steep, eroded	SzE2	VIe–5	Deep	Moderately slow	Moderately slow	Rapid	High	None	Good	Moderate	Difficult	Range.
Sweeney stony clay loam, very steep, eroded.	SzF2	VIIe–5	Deep	Moderately slow	Moderately slow	Very rapid	Very high	None	Good	Moderate	Difficult	Range.
Terrace escarpments	Ta	VIIIe–1				Very rapid	Very high	None	Variable	Low	Difficult	Barren.
Tierra clay loam, sloping, eroded	TcC2	IIIe–3	Shallow to moderately deep.	Moderately slow	Very slow	Slow to medium	Slight to moderate	None	Low	Low	Rather difficult	Grain, flax.
Tierra clay loam, moderately steep, eroded.	TcD2	IVe–3	Shallow to moderately deep.	Moderately slow	Very slow	Medium	Moderate to high	None	Low	Low	Difficult	Grain, flax, range.
Tierra loam, gently sloping	TeB	IIIs–3	Shallow to moderately deep.	Moderate	Very slow	Very slow to slow	Slight	None	Low	Low	Easy	Grain, flax.

TABLE 15.—*Summary of important qualities of the soils*—Continued

Name of soil	Symbol on map	Capability unit	Effective depth for roots	Permeability		Rate of runoff	Erosion hazard	Occurrence of high water table	Water-holding capacity	Natural fertility	Workability	Cover or present use
				Surface soil	Subsoil							
Tierra loam, sloping, eroded	TeC2	IIIe–3	Shallow to moderately deep.	Moderate	Very slow	Slow	Moderate	None	Low	Low	Fairly easy	Grain, flax.
Tierra loam, moderately steep, eroded	TeD2	IVe–3	Shallow to moderately deep.	Moderate	Very slow	Slow to medium	High	None	Low	Low	Rather difficult	Grain, flax, grazing.
Tierra loam, moderately steep, severely eroded.	TeD3	VIe–3	Very shallow to shallow.	Moderate to moderately slow.	Very slow	Rapid	High	None	Very low	Very low	Difficult	Range.
Tierra loam, steep, eroded	TeE2	VIe–3	Shallow to moderately deep.	Moderate to moderately slow.	Very slow	Very rapid	Very high	None	Low	Low	Difficult	Range, grain, flax.
Tierra loam, steep, severely eroded	TeE3	VIIe–3	Very shallow to shallow.	Moderately slow	Very slow	Very rapid	Very high	None	Very low	Very low	Difficult	Range.
Tierra sandy loam, sloping, eroded	TmC2	IIIe–3	Shallow to moderately deep.	Moderately rapid	Very slow	Slow	Moderate	None	Low	Low	Fairly easy	Grain, flax, range.
Tierra sandy loam, moderately steep, eroded.	TmD2	IVe–3	Shallow to moderately deep.	Moderately rapid	Very slow	Slow to medium	High	None	Low	Low	Rather difficult	Grain, flax, range.
Tierra sandy loam, acid variant, gently sloping.	TsB	IIIs–3	Moderately deep	Rapid	Very slow	Slow	Slight	None	Low	Low	Easy	Grain, flax.
Tierra sandy loam, acid variant, sloping, eroded.	TsC2	IIIe–3	Shallow to moderately deep.	Moderately rapid	Very slow	Slow to medium	Slight to moderate	None	Low	Low	Fairly easy	Grain, flax.
Tierra sandy loam, acid variant, moderately steep, eroded.	TsD2	IVe–3	Shallow to moderately deep.	Moderately rapid	Very slow	Medium	Medium to high	None	Low	Low	Rather difficult	Grain, flax, range.
Tierra sandy loam, acid variant, steep, severely eroded.	TsE3	VIe–3	Shallow	Moderate	Very slow	Very rapid	Very high	None	Very low	Low	Difficult	Range.
Tunitas clay loam, nearly level	TuA	IIs–3	Moderately deep to deep.	Moderately slow	Slow	Very slow	None to slight	None	Good to high	Moderate	Fairly easy	Truck, grain, flax.
Tunitas clay loam, gently sloping	TuB	IIs–3	Moderately deep to deep.	Moderately slow	Slow	Slow	Slight	None	Good to high	Moderate	Fairly easy	Truck, grain, flax.
Tunitas clay loam, sloping, eroded	TuC2	IIIe–3	Moderately deep to deep.	Moderately slow	Slow	Slow to medium	Slight to moderate	None	Good	Moderate	Rather difficult	Truck, grain, flax.
Tunitas clay loam, moderately steep, eroded.	TuD2	IVe–3	Moderately deep to deep.	Moderately slow	Slow	Medium	Moderate	None	Good	Moderate	Difficult	Grain, flax, pasture.
Tunitas clay loam, nearly level, imperfectly drained.	TwA	IIs–3	Moderately deep to deep.	Moderately slow	Slow	Very slow	None to slight	Occasional	Good to high	Moderate	Fairly easy	Truck, pasture.
Tunitas clay loam, gently sloping, imperfectly drained.	TwB	IIs–3	Moderately deep to deep.	Moderately slow	Slow	Slow	Slight	Occasional	Good to high	Moderate	Fairly easy	Truck, grain, flax, pasture.
Tunitas loam, nearly level	TxA	IIs–3	Moderately deep to deep.	Moderate	Slow	Very slow	None to slight	None	Good	Moderate	Fairly easy	Truck, pasture.
Tunitas loam, gently sloping	TxB	IIs–3	Moderately deep to deep.	Moderate	Slow	Slow	Slight	None	Good	Moderate	Fairly easy	Truck, pasture.
Tunitas loam, sloping, eroded	TxC2	IIIe–3	Moderately deep to deep.	Moderate	Slow	Slow to medium	Slight to moderate	None	Good	Moderate	Rather difficult	Truck, pasture, grain, flax.
Watsonville clay loam, nearly level	WaA	IIIs–3	Moderately deep	Moderately slow	Very slow	Very slow	None to slight	None	Low to good	Low	Easy	Grain, flax.
Watsonville clay loam, gently sloping	WaB	IIIs–3	Moderately deep	Moderately slow	Very slow	Slow	Slight	None	Low to good	Low	Easy	Grain, flax, pasture.
Watsonville clay loam, sloping, eroded	WaC2	IIIe–3	Moderately deep	Moderately slow	Very slow	Slow to medium	Slight to moderate	None	Low to good	Low	Fairly easy	Grain, flax.
Watsonville loam, nearly level	WmA	IIIs–3	Shallow to moderately deep.	Moderate	Very slow	Very slow	None to slight	None	Low	Low	Easy	Truck, grain, flax.
Watsonville loam, gently sloping	WmB	IIIs–3	Shallow to moderately deep.	Moderate	Very slow	Slow	Slight	None	Low	Low	Easy	Truck, grain, flax, pasture.
Watsonville loam, gently sloping, eroded	WmB2	IIIs–3	Shallow to moderately deep.	Moderate	Very slow	Slow	Slight to moderate	None	Low	Low	Easy	Truck, grain, flax, pasture.
Watsonville loam, sloping, eroded	WmC2	IIIe–3	Shallow to moderately deep.	Moderate	Very slow	Slow to medium	Slight to moderate	None	Low	Low	Fairly easy	Grain, flax, some truck.
Watsonville loam, sloping, severely eroded.	WmC3	IVe–3	Shallow	Moderate	Very slow	Slow to medium	High	None	Very low	Very low	Difficult	Grain, flax.
Watsonville loam, moderately steep, eroded.	WmD2	IVe–3	Shallow to moderately deep.	Moderate	Very slow	Medium	High	None	Low	Low	Difficult	Grain, flax.
Watsonville loam, moderately steep and steep, severely eroded.	WmE3	VIe–3	Very shallow	Moderately slow	Very slow	Rapid to very rapid.	Very high	None	Very low	Very low	Difficult	Range.
Watsonville loam, nearly level, poorly drained.	WnA	IIIw–2	Shallow to moderately deep.	Moderate	Very slow	Ponded to very slow.	None	General	Low	Low	Easy	Truck, pasture.
Watsonville loam, gently sloping, poorly drained.	WnB	IIIw–2	Shallow to moderately deep.	Moderate	Very slow	Very slow to slow	Slight	General	Low	Low	Easy	Truck, pasture.
Watsonville loamy sand, gently sloping, overblown.	WoB	IIIe–3	Shallow to moderately deep.	Rapid	Very slow	Very slow to slow	Slight (wind)	None	Low	Low	Easy	Truck.
Watsonville sandy loam, gently sloping	WsB	IIIs–3	Shallow to moderately deep.	Rapid	Very slow	Slow	Slight	None	Low	Low	Easy	Grain, flax, some truck.
Watsonville sandy loam, gently sloping, eroded.	WsB2	IIIs–3	Shallow to moderately deep.	Rapid	Very slow	Slow	Slight to moderate	None	Low	Low	Easy	Grain, flax, some truck.
Watsonville sandy loam, sloping, eroded	WsC2	IIIe–3	Shallow to moderately deep.	Rapid	Very slow	Slow to medium	Slight to moderate	None	Low	Low	Fairly easy	Grain, flax, some truck.
Watsonville sandy loam, moderately steep, eroded.	WsD2	IVe–3	Shallow to moderately deep.	Rapid	Very slow	Medium	High	None	Low	Low	Difficult	Grain, flax.
Watsonville sandy loam, thick surface, gently sloping, eroded.	WtB2	IIIe–1	Moderately deep to deep.	Rapid	Very slow	Slow	Slight	None	Low to good	Low	Difficult	Grain, flax.

Appendix II: Guide to Mapping Units[1]

Alphabetical symbol	Soil	Page	Capability unit	Page
Ad	Active dune land	43	VIIIe–1	25
BaB2	Baywood sandy loam, gently sloping, eroded	43	IIs–4	17
BaC2	Baywood sandy loam, sloping, eroded	43	IIIe–4	19
BaD2	Baywood sandy loam, moderately steep, eroded	43	IVe–3	20
BcA	Botella clay loam, nearly level	43	I–1	15
BcB	Botella clay loam, gently sloping	43	IIe–1	16
BcC2	Botella clay loam, sloping, eroded	44	IIIe–1	18
BdA	Botella loam, nearly level, imperfectly drained	44	IIw–2	17
BdB	Botella loam, gently sloping, imperfectly drained	44	IIw–2	17
BeB	Botella loam, gently sloping	44	IIe–1	16
BeC2	Botella loam, sloping, eroded	44	IIIe–1	18
BfB	Botella loam, nearly level and gently sloping, poorly drained variant	44	IIIw–2	20
BoC	Botella loam, sloping, seeped	44	IIIe–1	18
BsF	Butano shaly loam, very steep	45	VIIe–6	25
BuD	Butano loam, moderately steep	44	IVe–6	21
BuE	Butano loam, steep	44	VIe–6	23
BuF	Butano loam, very steep	45	VIIe–6	25
CaD2	Cayucos clay, moderately steep, eroded	46	IVe–5	21
CcC2	Cayucos clay loam, sloping, eroded	45	IIIe–1	18
CcD2	Cayucos clay loam, moderately steep, eroded	45	IVe–5	21
CcE2	Cayucos clay loam, steep, eroded	45	VIe–5	23
CcF2	Cayucos clay loam, very steep, eroded	45	VIIe–5	25
CcF3	Cayucos clay loam, steep and very steep, severely eroded	45	VIIe–5	25
CdC2	Cayucos clay loam, deep, sloping, eroded	45	IIIe–1	18
CdD2	Cayucos clay loam, deep, moderately steep, eroded	45	IVe–5	21
CeF2	Cayucos stony clay loam, very steep, eroded	46	VIIe–5	25
Cf	Coastal beaches	46	VIIIe–1	25
ClC2	Colma loam, sloping, eroded	47	IIIe–3	18
ClD2	Colma loam, moderately steep, eroded	47	IVe–3	20
ClE2	Colma loam, steep, eroded	47	VIe–3	22
ClF2	Colma loam, very steep, eroded	47	VIIe–3	24
CmC2	Colma sandy loam, sloping, eroded	46	IIIe–3	18
CmD2	Colma sandy loam, moderately steep, eroded	46	IVe–3	20
CmE2	Colma sandy loam, steep, eroded	47	VIe–3	22
CmF2	Colma sandy loam, very steep, eroded	46	VIIe–3	24
CmF3	Colma sandy loam, steep and very steep, severely eroded	47	VIIe–3	24
CoA	Coquille loam, nearly level, saline	48	IIIw–2	20
CrA	Corralitos loamy sand, nearly level, imperfectly drained	49	IIs–4	17
CsA	Corralitos sandy loam, nearly level	48	IIs–4	17
CsB	Corralitos sandy loam, gently sloping	48	IIs–4	17
CtA	Corralitos sandy loam, nearly level, imperfectly drained	48	IIw–2	17
CtB	Corralitos sandy loam, gently sloping, imperfectly drained	48	IIw–2	17
CuA	Corralitos sandy loam, over gravel, nearly level, imperfectly drained	48	IIs–4	17
CwB	Corralitos sandy loam, over gravel, gently sloping	48	IIs–4	17
CyA	Corralitos sandy loam, over clay, nearly level, imperfectly drained	48	IIw–2	17
DcA	Denison clay loam, nearly level	49	IIs–3	16
DdA	Denison clay loam, nearly level, imperfectly drained	49	IIw–2	17
DeA	Denison coarse sandy loam, nearly level	50	IIs–3	16
DmA	Denison loam, nearly level	49	IIs–3	16
DmB	Denison loam, gently sloping	50	IIe–1	16
DmC	Denison loam, sloping	50	IIIe–1	18
DuA	Dublin clay, nearly level	50	IIw–2	17
DuB	Dublin clay, gently sloping	50	IIe–1	16
DuC2	Dublin clay, sloping, eroded	50	IIIe–1	18
DuD2	Dublin clay, moderately steep, eroded	50	IVe–5	21
DwA	Dublin clay, nearly level, imperfectly drained	50	IIw–2	17
DwB	Dublin clay, gently sloping, imperfectly drained	50	IIw–2	17
EhB	Elkhorn sandy loam, gently sloping	51	IIIs–3	19
EhB2	Elkhorn sandy loam, gently sloping, eroded	52	IIIs–3	19
EhC2	Elkhorn sandy loam, sloping, eroded	51	IIIe–3	18
EhD2	Elkhorn sandy loam, moderately steep, eroded	52	IVe–3	20
EhE3	Elkhorn sandy loam, moderately steep and steep, severely eroded	52	VIe–3	22
EtB	Elkhorn sandy loam, thick surface, gently sloping	52	IIs–3	16
EtC2	Elkhorn sandy loam, thick surface, sloping, eroded	52	IIIe–1	18
FaA	Farallone loam, nearly level	53	I–1	15
FaB	Farallone loam, gently sloping	53	IIe–1	16
FcA	Farallone coarse sandy loam, nearly level	52	IIs–4	17
FcB	Farallone coarse sandy loam, gently sloping	52	IIs–4	17
FcC2	Farallone coarse sandy loam, sloping, eroded	52	IIIe–4	19
FcD2	Farallone coarse sandy loam, moderately steep, eroded	53	IVe–1	20
FsB	Farallone coarse sandy loam, over coarse sands, gently sloping, seeped	53	IIw–2	17
FyB	Farallone loamy coarse sand, gently sloping	53	IIs–4	17
FyC2	Farallone loamy coarse sand, sloping, eroded	53	IIIe–4	19
GaD2	Gazos fine sandy loam, moderately steep, eroded	54	IVe–1	20

See footnote at end of table.

Alphabetical symbol	Soil	Page	Capability unit	Page
GaE2	Gazos fine sandy loam, steep, eroded	54	VIe–1	21
GbC2	Gazos loam, sloping, eroded	53	IIIe–1	18
GbD2	Gazos loam, moderately steep, eroded	53	IVe–1	20
GbD3	Gazos loam, moderately steep, severely eroded	54	VIe–1	21
GbE2	Gazos loam, steep, eroded	54	VIe–1	21
GbF2	Gazos loam, very steep, eroded	53	VIIe–1	23
GcC2	Gazos (dark phase)-Calera loams, sloping, eroded	55	IIIe–1	18
GcE2	Gazos (dark phase)-Calera loams, steep, eroded	55	VIe–1	21
GcF2	Gazos (dark phase)-Calera loams, very steep, eroded	55	VIIe–1	23
GdC2	Gazos loam, dark, sloping, eroded	54	IIIe–1	18
GkE2	Gazos (dark phase)-Sweeney loams, steep, eroded	55	VIe–1	21
GlB	Gazos-Lobitos silt loams, gently sloping	54	IIIe–1	18
GlC2	Gazos-Lobitos silt loams, sloping, eroded	54	IIIe–1	18
GlD2	Gazos-Lobitos silt loams, moderately steep, eroded	54	IVe–1	20
GlE2	Gazos-Lobitos silt loams, steep, eroded	54	VIe–1	21
GlF	Gazos-Lobitos silt loams, very steep	54	VIIe–1	23
GoF3	Gazos and Lobitos soils, steep and very steep, severely eroded	54	VIIe–1	23
GsE2	Gazos and Lobitos stony loams, steep, eroded	54	VIe–1	21
GsF2	Gazos and Lobitos stony loams, very steep, eroded	54	VIIe–1	23
Gu	Gullied land (alluvial soil material)	55	VIIIe–1	25
Gv	Gullied land (Gazos-Lobitos soil material)	55	VIIIe–1	25
Gw	Gullied land (Tierra and Watsonville soil materials)	55	VIIIe–1	25
HuC	Hugo and Josephine loams, sloping	56	IIIe–1	18
HuD	Hugo and Josephine loams, moderately steep	56	IVe–6	21
HuD2	Hugo and Josephine loams, moderately steep, eroded	56	IVe–6	21
HuE	Hugo and Josephine loams, steep	56	VIe–6	23
HuE2	Hugo and Josephine loams, steep, eroded	56	VIe–6	23
HuF	Hugo and Josephine loams, very steep	56	VIIe–6	25
HvB	Hugo and Josephine loams, very deep, gently sloping	56	IIe–1	16
HvC	Hugo and Josephine loams, very deep, sloping	56	IIIe–1	18
HyC2	Hugo and Josephine sandy loams, sloping, eroded	56	IIIe–1	18
HyD2	Hugo and Josephine sandy loams, moderately steep, eroded	56	IVe–6	21
HyE	Hugo and Josephine sandy loams, steep	56	VIe–6	23
HyE2	Hugo and Josephine sandy loams, steep, eroded	55	VIe–6	23
HyF	Hugo and Josephine sandy loams, very steep	55	VIIe–6	25
HyF2	Hugo and Josephine sandy loams, very steep, eroded	55	VIIe–6	25
HzC	Hugo and Josephine sandy loams, very deep, sloping	56	IIIe–1	18
HzD	Hugo and Josephine sandy loams, very deep, moderately steep	56	IVe–6	21
LaC2	Laughlin loam, sloping, eroded	57	IIIe–1	18
LaD2	Laughlin loam, moderately steep, eroded	57	IVe–1	20
LaE2	Laughlin loam, steep, eroded	57	VIe–1	21
LaF2	Laughlin loam, very steep, eroded	57	VIIe–1	23
LbC2	Laughlin-Sweeney loams, sloping, eroded	57	IIIe–1	18
LbD2	Laughlin-Sweeney loams, moderately steep, eroded	57	IVe–1	20
LbE2	Laughlin-Sweeney loams, steep, eroded	57	VIe–1	21
LbF2	Laughlin-Sweeney loams, very steep, eroded	57	VIIe–1	23
LdC2	Lobitos loam, deep, sloping, eroded	58	IIIe–1	18
LdD2	Lobitos loam, deep, moderately steep, eroded	58	IVe–1	20
LfC2	Lobitos fine sandy loam, sloping, eroded	58	IIIe–1	18
LfD2	Lobitos fine sandy loam, moderately steep, eroded	58	IVe–1	20
LfE2	Lobitos fine sandy loam, steep, eroded	58	VIe–1	21
LlC2	Lobitos loam, sloping, eroded	58	IIIe–1	18
LlD2	Lobitos loam, moderately steep, eroded	58	IVe–1	20
LlE2	Lobitos loam, steep, eroded	58	VIe–1	21
LlF2	Lobitos loam, very steep, eroded	58	VIIe–1	23
LmB	Lockwood loam, gently sloping	58	IIe–1	16
LmC2	Lockwood loam, sloping, eroded	59	IIIe–1	18
LoA	Lockwood loam, nearly level, imperfectly drained	59	IIw–2	17
LsB	Lockwood shaly loam, gently sloping	59	IIe–1	16
LvB2	Lockwood loam, brown subsoil variant, gently sloping, eroded	60	IIIs–3	19
LvC2	Lockwood loam, brown subsoil variant, sloping, eroded	60	IIIe–3	19
LvD2	Lockwood loam, brown subsoil variant, moderately steep, eroded	60	IVe–3	20
LwB	Lockwood loam, gently sloping, seeped	59	IIw–2	17
LwC	Lockwood loam, sloping, seeped	59	IIIe–1	18
LyC2	Los Gatos clay loam, sloping, eroded	60	IIIe–1	18
LyE2	Los Gatos clay loam, steep, eroded	60	VIe–1	21
LzF	Los Gatos loam, very steep	60	VIIe–1	23
Ma	Mixed alluvial land	61	VIIIe–1	25
MdE	Mindego clay loam, steep	61	VIe–6	23
MdF	Mindego clay loam, very steep	60	VIIe–6	25
MgF	Mindego stony clay loam, very steep	61	VIIe–6	25
MmC2	Miramar coarse sandy loam, sloping, eroded	61	IIIe–1	18
MmD2	Miramar coarse sandy loam, moderately steep, eroded	61	IVe–1	20
MmE2	Miramar coarse sandy loam, steep, eroded	61	VIe–4	22
MmE3	Miramar coarse sandy loam, steep, severely eroded	61	VIIe–4	24
MmF2	Miramar coarse sandy loam, very steep, eroded	61	VIIe–4	24
MoF2	Montara stony loam, steep and very steep, eroded	61	VIIe–1	23

Alphabetical symbol	Soil	Page	Capability unit	Page
PoC2	Pomponio clay loam, sloping, eroded	62	IIIe–3	18
PoD2	Pomponio clay loam, moderately steep, eroded	62	IVe–3	20
PpC2	Pomponio loam, sloping, eroded	62	IIIe–3	18
PpD2	Pomponio loam, moderately steep, eroded	62	IVe–3	20
PpE2	Pomponio loam, steep, eroded	62	VIe–3	22
Rb	Rough broken land	62	VIIIe–1	25
SaC2	Santa Lucia loam, sloping, eroded	62	IIIe–1	18
SaD2	Santa Lucia loam, moderately steep, eroded	63	IVe–1	20
SaE2	Santa Lucia loam, steep, eroded	63	VIe–1	21
SaF2	Santa Lucia loam, very steep, eroded	62	VIIe–1	23
SaF3	Santa Lucia loam, steep and very steep, severely eroded	63	VIIe–1	23
SbE2	Santa Lucia stony loam, steep, eroded	63	VIe–1	21
SbF2	Santa Lucia stony loam, very steep, eroded	63	VIIe–1	23
SbF3	Santa Lucia stony loam, steep and very steep, severely eroded	63	VIIe–1	23
ScF3	Santa Lucia stony loam, very shallow, steep and very steep, severely eroded	63	VIIe–1	23
Sd	Stabilized dune land	64	VIIIe–1	25
ShD	Sheridan coarse sandy loam, moderately steep	63	IVe–6	21
ShE	Sheridan coarse sandy loam, steep	63	VIe–6	23
ShF	Sheridan coarse sandy loam, very steep	63	VIIe–6	25
SkA	Soquel loam, nearly level	64	I–1	15
SkB	Soquel loam, gently sloping	64	IIe–1	16
SkC2	Soquel loam, sloping, eroded	64	IIIe–1	18
SmA	Soquel loam, nearly level, imperfectly drained	64	IIw–2	17
SoA	Soquel loam, over clay, nearly level	64	I–1	15
SpB	Soquel loam, gently sloping, poorly drained	64	IIIw–2	20
SrA	Soquel loam, over clay, nearly level, poorly drained	64	IIIw–2	20
SsA	Soquel loam, over clay, nearly level, imperfectly drained	64	IIw–2	17
StC	Sweeney clay, sloping	65	IIIe–1	18
StD2	Sweeney clay, moderately steep, eroded	65	IVe–5	21
SwC2	Sweeney clay loam, sloping, eroded	65	IIIe–1	18
SwD2	Sweeney clay loam, moderately steep, eroded	65	IVe–5	21
SwE2	Sweeney clay loam, steep, eroded	65	VIe–5	23
SwF2	Sweeney clay loam, very steep, eroded	65	VIIe–5	25
SwF3	Sweeney clay loam, steep and very steep, severely eroded	65	VIIe–5	25
SxC2	Sweeney clay loam, deep, sloping, eroded	65	IIIe–1	18
SxD2	Sweeney clay loam, deep, moderately steep, eroded	65	IVe–5	21
SyC2	Sweeney loam, sloping, eroded	65	IIIe–1	18
SyD2	Sweeney loam, moderately steep, eroded	65	IVe–5	21
SyE2	Sweeney loam, steep, eroded	66	VIe–5	23
SyF2	Sweeney loam, very steep, eroded	66	VIIe–5	25
SzD2	Sweeney stony clay loam, moderately steep, eroded	65	IVe–5	21
SzE2	Sweeney stony clay loam, steep, eroded	65	VIe–5	23
SzF2	Sweeney stony clay loam, very steep, eroded	65	VIIe–5	25
Ta	Terrace escarpments	66	VIIIe–1	25
TcC2	Tierra clay loam, sloping, eroded	68	IIIe–3	18
TcD2	Tierra clay loam, moderately steep, eroded	68	IVe–3	20
TeB	Tierra loam, gently sloping	66	IIIs–3	19
TeC2	Tierra loam, sloping, eroded	67	IIIe–3	18
TeD2	Tierra loam, moderately steep, eroded	66	IVe–3	20
TeD3	Tierra loam, moderately steep, severely eroded	67	VIe–3	22
TeE2	Tierra loam, steep, eroded	67	VIe–3	22
TeE3	Tierra loam, steep, severely eroded	67	VIIe–3	24
TmC2	Tierra sandy loam, sloping, eroded	67	IIIe–3	18
TmD2	Tierra sandy loam, moderately steep, eroded	68	IVe–3	20
TsB	Tierra sandy loam, acid variant, gently sloping	68	IIIs–3	19
TsC2	Tierra sandy loam, acid variant, sloping, eroded	68	IIIe–3	18
TsD2	Tierra sandy loam, acid variant, moderately steep, eroded	68	IVe–3	20
TsE3	Tierra sandy loam, acid variant, steep, severely eroded	68	VIe–3	22
TuA	Tunitas clay loam, nearly level	69	IIs–3	16
TuB	Tunitas clay loam, gently sloping	69	IIs–3	16
TuC2	Tunitas clay loam, sloping, eroded	69	IIIe–3	18
TuD2	Tunitas clay loam, moderately steep, eroded	69	IVe–3	20
TwA	Tunitas clay loam, nearly level, imperfectly drained	69	IIs–3	16
TwB	Tunitas clay loam, gently sloping, imperfectly drained	69	IIs–3	16
TxA	Tunitas loam, nearly level	69	IIs–3	16
TxB	Tunitas loam, gently sloping	69	IIs–3	16
TxC2	Tunitas loam, sloping, eroded	70	IIIe–3	18
WaA	Watsonville clay loam, nearly level	72	IIIs–3	19
WaB	Watsonville clay loam, gently sloping	72	IIIs–3	19
WaC2	Watsonville clay loam, sloping, eroded	72	IIIe–3	18
WmA	Watsonville loam, nearly level	71	IIIs–3	19
WmB	Watsonville loam, gently sloping	71	IIIs–3	19
WmB2	Watsonville loam, gently sloping, eroded	70	IIIs–3	19
WmC2	Watsonville loam, sloping, eroded	70	IIIe–3	18
WmC3	Watsonville loam, sloping, severely eroded	71	IVe–3	20
WmD2	Watsonville loam, moderately steep, eroded	70	IVe–3	20
WmE3	Watsonville loam, moderately steep and steep, severely eroded	71	VIe–3	22

Alphabetical symbol	Soil	Page	Capability unit	Page
WnA	Watsonville loam, nearly level, poorly drained	72	IIIw–2	20
WnB	Watsonville loam, gently sloping, poorly drained	72	IIIw–2	20
WoB	Watsonville loamy sand, gently sloping, overblown	73	IIIe–3	18
WsB	Watsonville sandy loam, gently sloping	72	IIIs–3	19
WsB2	Watsonville sandy loam, gently sloping, eroded	72	IIIs–3	19
WsC2	Watsonville sandy loam, sloping, eroded	72	IIIe–3	18
WsD2	Watsonville sandy loam, moderately steep, eroded	72	IVe–3	20
WtB2	Watsonville sandy loam, thick surface, gently sloping, eroded	72	IIIe–1	18

[1] Table 5, p. 26, gives the Storie index rating of the soils; table 6, p. 30, indicates relative suitability of the soils for general intensive agriculture and for the principal crops grown in the San Mateo Area; and table 10, p. 40, gives the approximate acreage and proportionate extent of the soils. To learn about the engineering properties of the soils, see section, Engineering Interpretations, beginning p. 36.

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